

From: Roddy, Elizabeth A CIV USN NAVFAC SW SAN CA (USA)
[elizabeth.rodny@navy.mil]

Sent: Tuesday, April 27, 2021 3:31 PM

To: Praskins, Wayne [Praskins.Wayne@epa.gov]; Juanita.bacey@dtsc.ca.gov; Han, Terry (Terry.Han@cdph.ca.gov) [Terry.Han@cdph.ca.gov]

CC: Stoick, Paul T CIV USN NAVFAC SW SAN CA (USA) [paul.stoick@navy.mil];
Robinson, Derek J CIV USN NAVFAC SW SAN CA (USA) [derek.j.robinson1@navy.mil];
Liscio, Matthew P CIV USN NAVSEA DET RASO VA (USA) [matthew.liscio@navy.mil]

Subject: N62473-17-D-0006 CTO: N6247318F5065 Parcel G - Soil Data Package TU-153

Attachments: CTO5065_RSY31Use1_DataPackageRev1_04192021.pdf;
CTO5065_RSY32Use1_DataPackageRev3_04202021.pdf

Dear Wayne, Nina and Terry,

To support the agencies oversight/split sampling effort and as a curtesy of information sharing, attached you will find the Soil Data Package for Parcel G Phase 1 TU-153.

Please let me know if you have any questions.

Very Respectfully,

Liz Roddy
Remedial Project Manager
NAVFAC BRAC PMO West
33000 Nixie Way
Bldg. 50, Floor 2
San Diego, CA 92147
(619) 524-5755
elizabeth.rodny@navy.mil

Hunters Point Naval Shipyard, Parcel G, RSY Data Report

Contract No. N62473-17-D-006 CTO N6247318F5065 RSY Pad Data Report	
RSY Pad: RSY 31 Use 1	Soil Origin: TU153A SFU
Data attached and submitted by: Amy Mangel	Data Report Submittal Date: 01/27/2021

Systematic Soil Sample Data: RSY 31 Use 1									
Sample Identification	Sample Location	Type of Sample	Gamma Static 3x3 NaI Reading (CPM)	Gamma 3x3 Static Investigation Level (CPM)	²²⁶ Ra Final Analytical Results (pCi/g)	¹³⁷ Cs Final Analytical Results (pCi/g)	Total Beta Sr Final Analytical Results (pCi/g)	²³⁵ U Final Analytical Results (pCi/g)	²³⁹ Pu Final Analytical Results (pCi/g)
Project Remediation Goals*					1.861	0.141	0.331	0.195	2.59
HPPG-SFU-TU153A-001	1	Systematic	8,630	15,658	0.0161	0.00176	-0.0609	0.0312	-0.00409
HPPG-SFU-TU153A-002	2	Systematic	8,748	15,658	0.0518	0.000	N/A	N/A	N/A
HPPG-SFU-TU153A-003	3	Systematic	8,026	15,658	0.167	-0.0141	N/A	N/A	N/A
HPPG-SFU-TU153A-004	4	Systematic	8,783	15,658	0.198	0.00194	N/A	N/A	N/A
HPPG-SFU-TU153A-005	5	Systematic	8,512	15,658	0.297	0.00204	N/A	N/A	N/A
HPPG-SFU-TU153A-006	6	Systematic	8,509	15,658	0.157	-0.0167	N/A	N/A	N/A
HPPG-SFU-TU153A-007	7	Systematic	8,786	15,658	0.172	0.000	N/A	N/A	N/A
HPPG-SFU-TU153A-008	8	Systematic	8,296	15,658	0.306	0.00899	N/A	N/A	N/A
HPPG-SFU-TU153A-009	9	Systematic	8,574	15,658	0.251	0.0186	N/A	N/A	N/A
HPPG-SFU-TU153A-010	10	Systematic	8,997	15,658	0.178	-0.0346	N/A	N/A	N/A
HPPG-SFU-TU153A-011	11	Systematic	8,752	15,658	0.331	0.00844	-0.0790	0.00517	0.00591
HPPG-SFU-TU153A-012	12	Systematic	8,394	15,658	0.271	-0.0385	N/A	N/A	N/A
HPPG-SFU-TU153A-013	13	Systematic	8,799	15,658	-0.00787	0.0194	N/A	N/A	N/A
HPPG-SFU-TU153A-014	14	Systematic	9,089	15,658	0.160	0.00827	N/A	N/A	N/A
HPPG-SFU-TU153A-015	15	Systematic	8,802	15,658	0.189	0.0205	N/A	N/A	N/A
HPPG-SFU-TU153A-016	16	Systematic	9,070	15,658	0.262	0.0160	N/A	N/A	N/A
HPPG-SFU-TU153A-017	17	Systematic	8,287	15,658	0.216	-0.0333	N/A	N/A	N/A
HPPG-SFU-TU153A-018	18	Systematic	9,754	15,658	0.420	0.0446	N/A	N/A	N/A
HPPG-SFU-TU153A-019	19	Systematic	9,167	15,658	0.303	0.00391	N/A	N/A	N/A
HPPG-SFU-TU153A-020	20	Systematic	9,448	15,658	0.434	-0.0422	N/A	N/A	N/A
HPPG-SFU-TU153A-021	21	Systematic	9,366	15,658	0.123	0.0191	0.0365	0.00748	0.00420
HPPG-SFU-TU153A-022	22	Systematic	9,892	15,658	0.314	0.00533	N/A	N/A	N/A
HPPG-SFU-TU153A-023	23	Systematic	9,617	15,658	0.293	0.0345	N/A	N/A	N/A
HPPG-SFU-TU153A-024	24	Systematic	8,475	15,658	0.251	-0.0117	N/A	N/A	N/A
HPPG-SFU-TU153A-025	25	Systematic	10,786	15,658	0.345	-0.0313	N/A	N/A	N/A
Soil Systematic Sample Statistics					²²⁶ Ra Final Analytical Results (pCi/g)	¹³⁷ Cs Final Analytical Results (pCi/g)	Total Beta Sr Final Analytical Results (pCi/g)	²³⁵ U Final Analytical Results (pCi/g)	²³⁹ Pu Final Analytical Results (pCi/g)
Maximum					0.434	0.0446	0.079	0.0312	0.0059
Mean					0.2279	-0.0004	0.0182	0.0146	0.002
Median					0.251	0.002	0.0365	0.0075	0.0042
Minimum					-0.0079	-0.0422	-0.0609	0.0052	-0.0041
Standard Deviation					0.1118	0.0227	N/A	N/A	N/A

Biased Soil Sample Data: RSY 31 Use 1									
Sample Identification	Sample Location	Type of Sample	Gamma Static 3x3 NaI Reading (CPM)	Gamma 3x3 Static Investigation Level (CPM)	²²⁶ Ra Final Analytical Results (pCi/g)	¹³⁷ Cs Final Analytical Results (pCi/g)	Total Beta Sr Final Analytical Results (pCi/g)	²³⁵ U Final Analytical Results (pCi/g)	²³⁹ Pu Final Analytical Results (pCi/g)
Project Remediation Goals*					1.861	0.141	0.331	0.195	2.59
HPPG-SFU-TU153A-B-001	1	Biased	9,973	15,658	0.385	-0.0247	-0.0105	0.0123	0.000

CPM Counts per minute

pCi/g Picocuries per gram

* Note: Project Remediation goal (RG) is the Record of Decision RG or Offsite RBA value, whichever is higher

Instrument and Survey Summary					
Activity	Survey #	Date	Meter	Calibration Due Date	Serial #
Gamma Walkover Survey	HPRS-10132020-PG-ROV-175	10/13/2020	RS-700	03/31/2022	5447/5448
Follow-Up Static Survey	HPRS-10142020-PG-JSS-179	10/14/2020	RS-700	03/31/2022	5447/5448
Systematic Sample Survey	HPRS-10142020-PG-JSS-177	10/14/2020	3x3	08/06/2021	108853
Biased Sample Survey	HPRS-10152020-PG-JSS-181	10/15/2020	3x3	08/06/2021	108853

Region of Interest (ROI) Summary	
ROI	Nuclide and Energy
ROI 3	Ra-226 (1764 keV)
ROI 6	Ra-226 (609 keV)
ROI 7	Cs-137 (662 keV)
ROI 8	Ra-226 (351 keV)
ROI 10	Gross Gamma

Summary: RSY 31 Use 1
<p>1) Gamma walkover survey and data review—upon review of initial RS-700 scan data in accordance with Final Parcel G Work Plan Section 3.5.1.1, 54 follow-up static investigations were required. Gamma scan data summary statistics, normal Q-Q plots, histograms, and box plots are provided on pages 3-6. Contour maps of the scan data for the ROIs of interest are presented on page 7. The RSY scan data was lower than the background scan data. The exact same RS-700 and detectors were used for the background data collection and the RSY pad data collection.</p>
<p>2) One-minute static follow-up measurements with the RS-700 were collected at 54 gamma walkover investigation locations in accordance with Final Parcel G Work Plan Section 3.3.1. A map of the follow-up locations is presented on page 9. The net follow-up static spectra are presented on pages 14-67. The exact same RS-700 and detectors were used for the background data collection and the RSY pad data collection.</p>
<p>3) In accordance with Final Parcel G Work Plan Section 3.4.1, twenty-five systematic soil samples (001-025) were obtained and submitted for gamma spectroscopy analysis. Sample locations are shown on the Systematic Sample Survey map (page 10). TestAmerica sample results are attached (pages 68-118). Ten percent of the systematic soil samples were also analyzed for total strontium, as well as for ²³⁵U and ²³⁹Pu by alpha spectroscopy. Total Strontium, ²³⁵U, and ²³⁹Pu results are also included in the TestAmerica sample results report (pages 29-66). Samples HPPG-F-011 and HPPG-F-012 are field duplicates, correlating to systematic samples -008 and -017. The Data Quality Assessment which will be included in the RACR will provide an analysis and discussion of field duplicates for the project. The alpha spectroscopy analyses for Uranium-235 and Plutonium-239 were requested after the samples and COC had been shipped to the lab (pages 149-150), which is why those analyses are not marked on the COCs. The Instrument and Survey Summary table above lists the 3x3 NaI detector used for the gamma static measurements collected during sampling activities, and the instrument-specific gamma static IL listed in the sample tables on page one is developed from that instrument's RBA data.</p> <p>Systematic sample histograms, box plots, Q-Q plots, and power curves are provided on pages 12-13. All sample results were below the applicable RGs. The number of samples collected was sufficient to meet project DQOs.</p>
<p>4) In accordance with Final Parcel G Work Plan Section 3.3.1 and 3.4.1, one biased sample was collected since all follow-up static measurements were below the ROC-specific critical levels. The biased sample was collected from the location of the highest gross gamma scan measurement. TestAmerica sample results are attached (pages 119-148). A map of the biased sample location is presented on page 11. Biased sample results were all below the applicable RGs.</p>
<p>Conclusions:</p> <p>In accordance with the DQOs in Section 3.1 of the Final Parcel G Work Plan, final analytical results for all samples from the RSY pad were shown by a point by point comparison to meet the RGs. Graphical comparisons demonstrated that ROC concentrations were consistent with background.</p> <p>RSY 31 Use 1 contains soil from Hunters Point Naval Shipyard Parcel G Phase 1 excavation TU-153A SFU.</p> <p>APTIM requests RASO concurrence to release this soil as Non-LLRW.</p> <p>Disposition: This soil shall be used as backfill for TU-153.</p>

Soil Scan Statistics

Statistical Summary

Dataset	PG-RSY-31-U1				
ROI	Minimum (cps)	Maximum (cps)	Mean (cps)	Median (cps)	Standard Deviation (cps)
ROI-03	0.00	25.05	11.30	11.02	3.59
ROI-06	42.08	125.25	76.97	76.16	11.12
ROI-07	32.07	98.23	59.93	59.13	9.43
ROI-08	55.11	157.31	97.75	97.20	13.04
ROI-10	1,715.29	2,565.44	2,044.29	2,018.12	146.58

Statistical Summary Reference Background

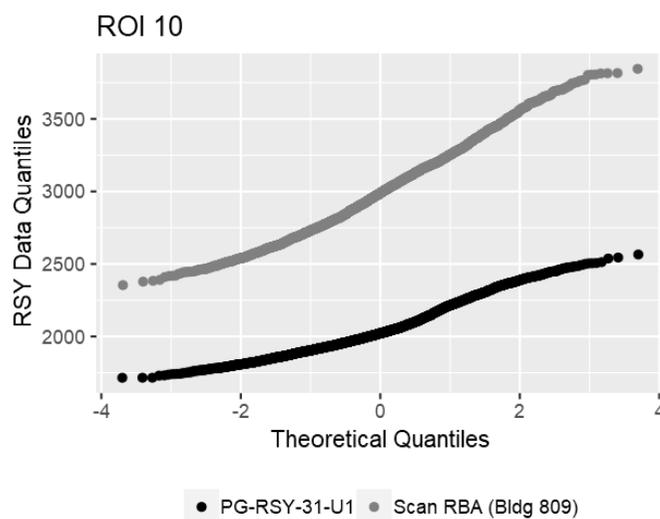
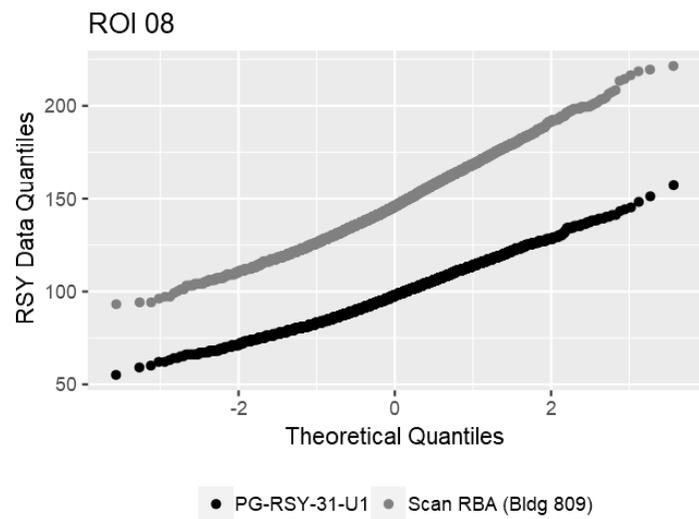
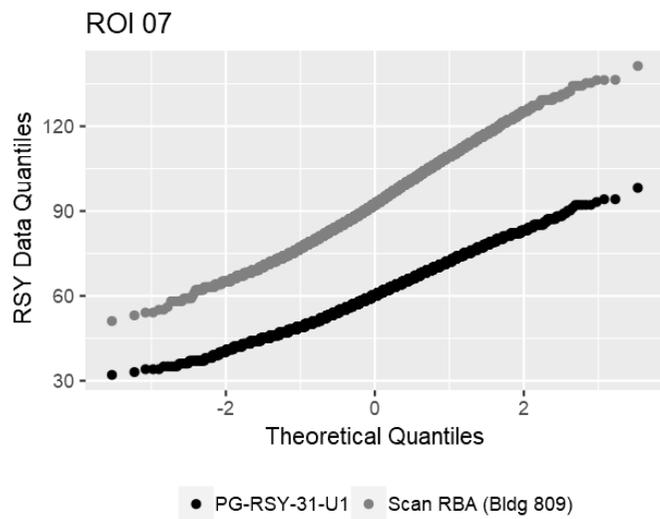
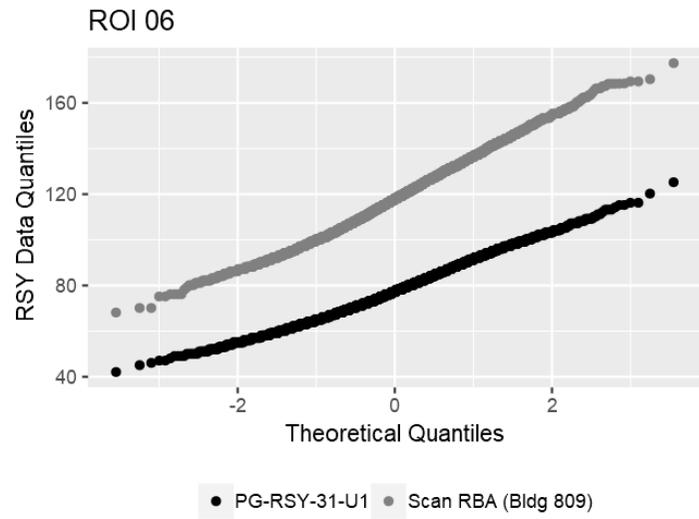
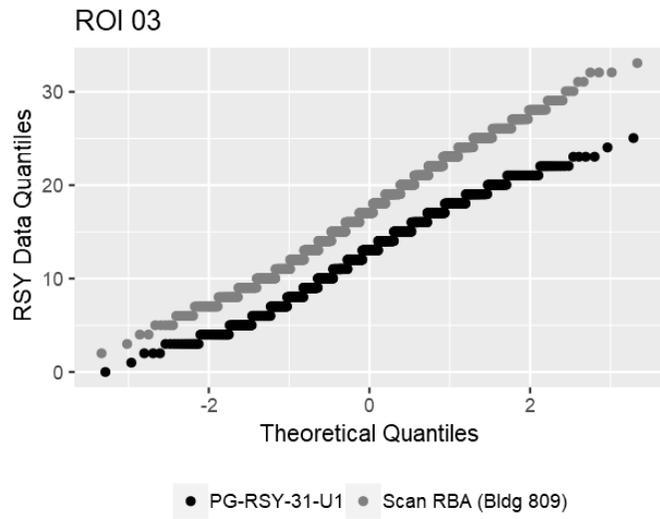
TYPE	Scan RBA (Bldg 809)				
ROI	Minimum (cps)	Maximum (cps)	Mean (cps)	Median (cps)	Standard Deviation (cps)
ROI-03	2.00	33.08	16.21	16.04	4.13
ROI-06	68.15	177.45	117.58	117.26	15.50
ROI-07	51.11	141.33	92.34	91.24	13.43
ROI-08	93.19	221.48	146.24	145.30	18.21
ROI-10	2,354.11	3,845.31	2,995.57	2,989.64	255.66

cps = counts per second

Dataset	Number of Data Points
PG-RSY-31-U1	4958
Scan RBA (Bldg 809)	4632

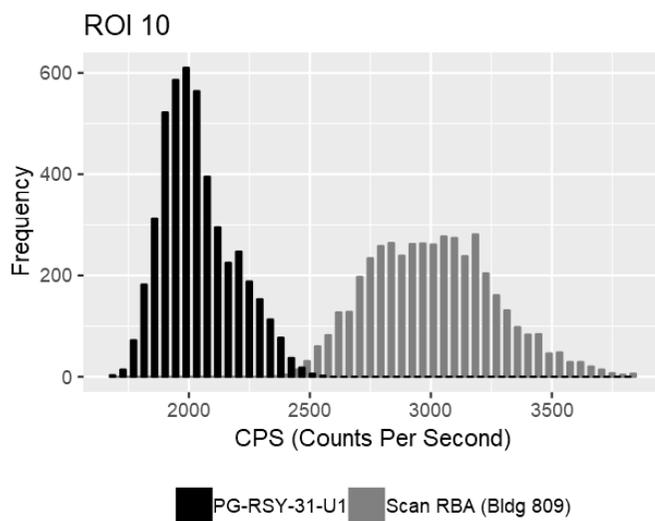
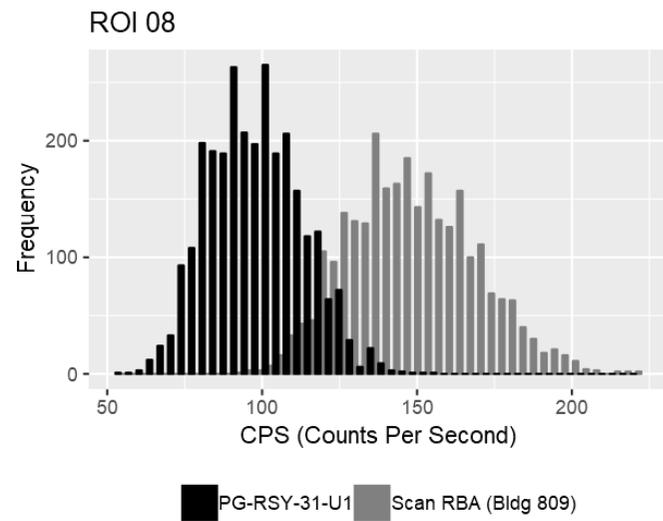
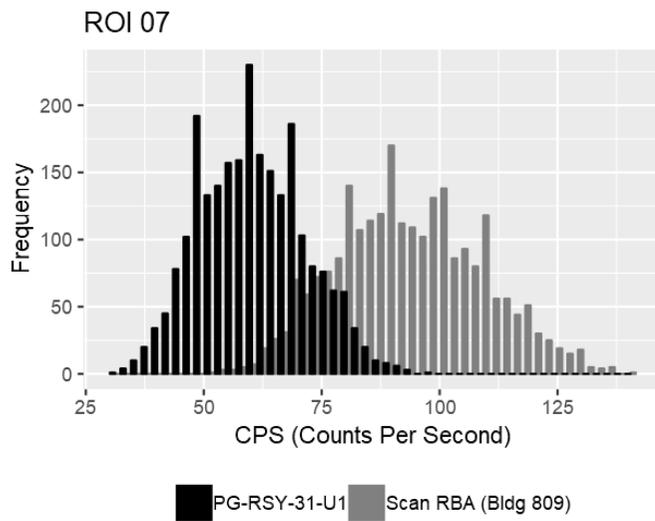
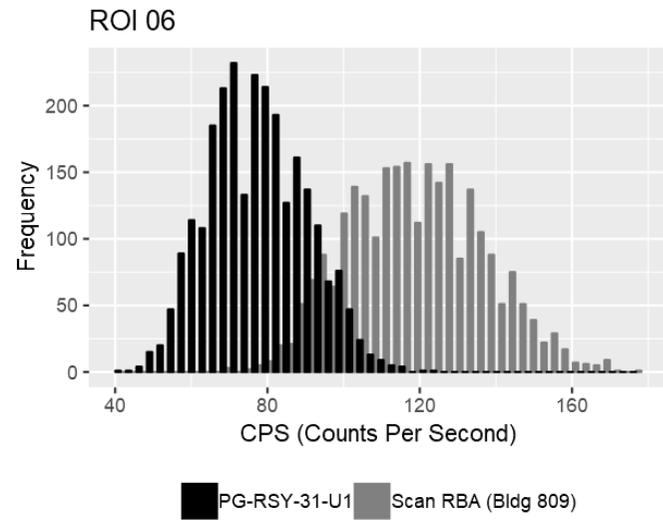
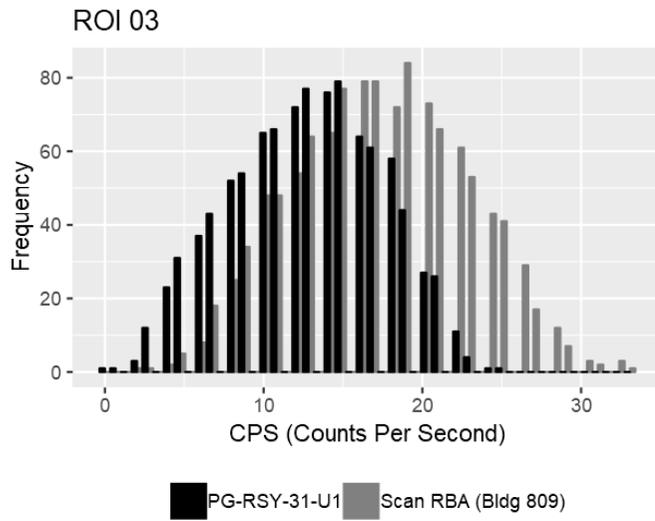
Soil Scan Statistics

Normal Q-Q Plots



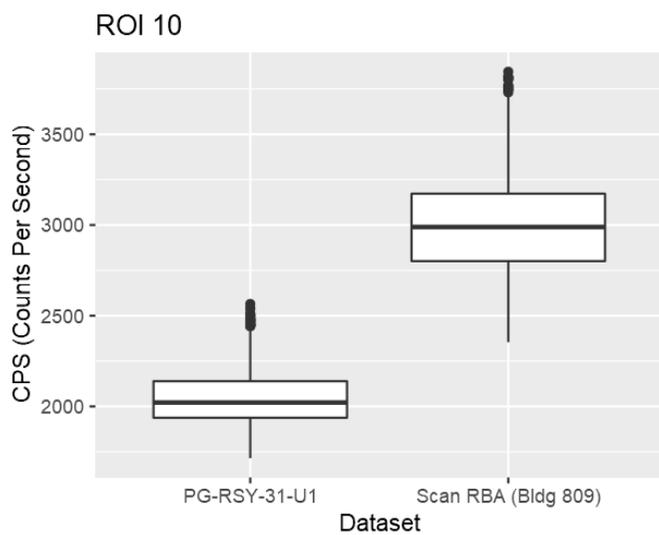
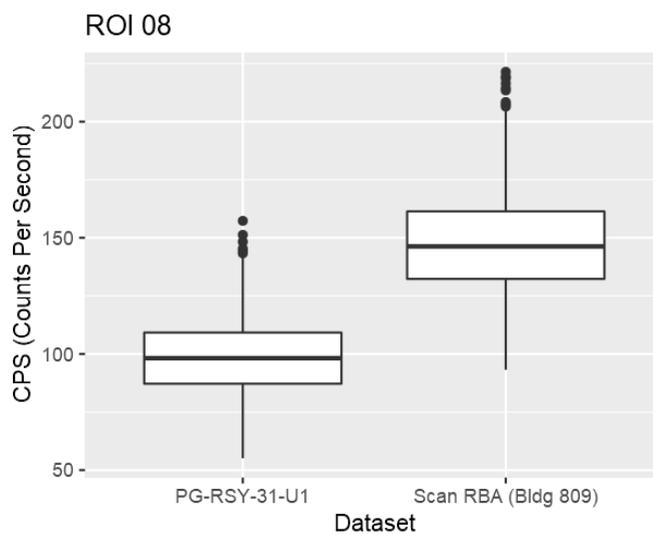
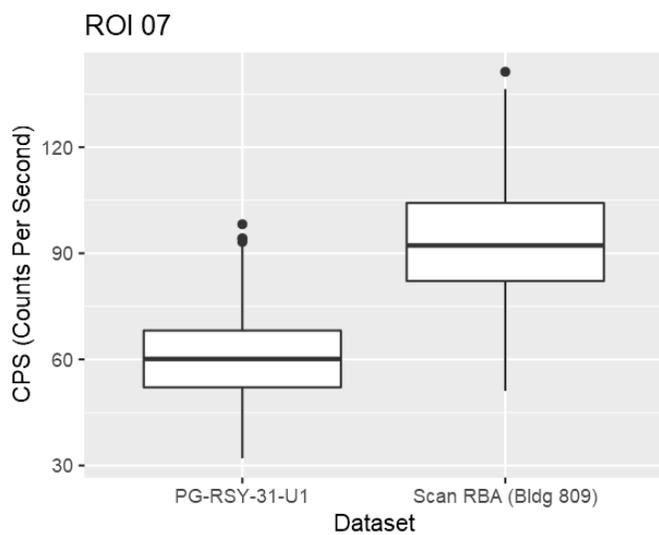
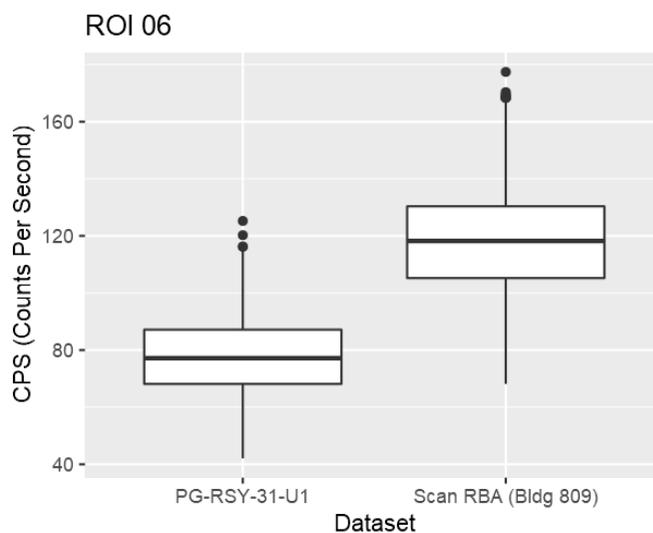
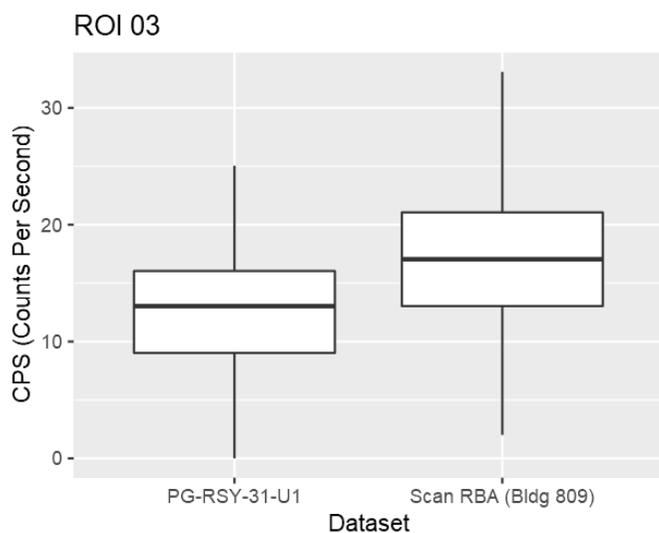
Soil Scan Statistics

Histograms



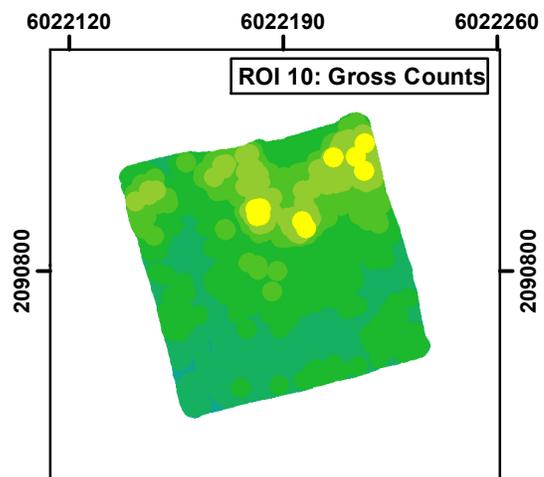
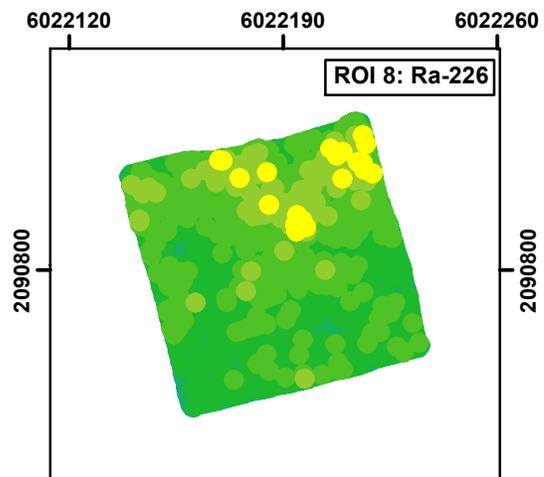
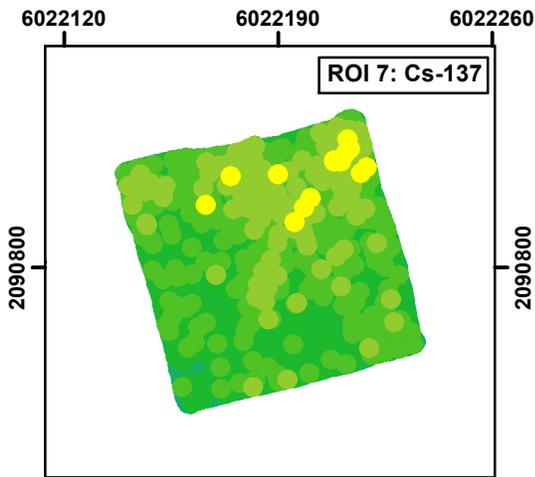
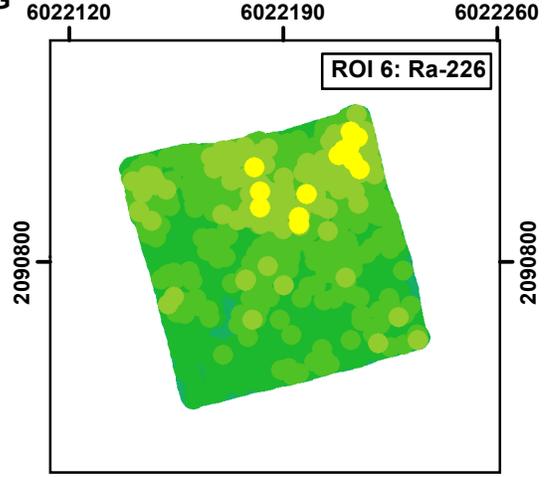
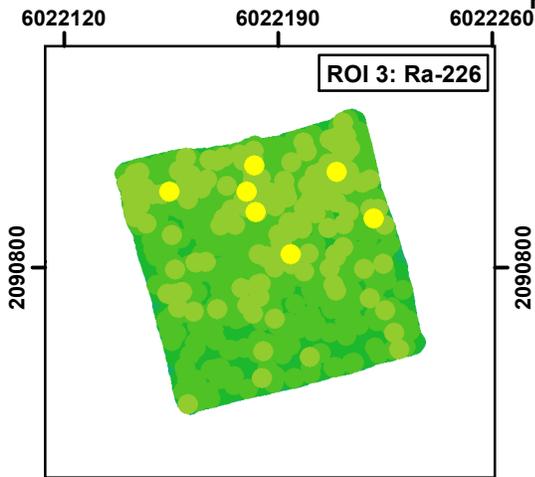
Soil Scan Statistics

Box Plots



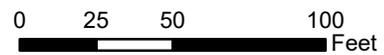
RSI Data Plots
HPNS Parcel G
RSY 31

TU-153A ESU



RS 700 Gamma Walkover Survey Data (VD1)

- > 3 std dev
- > 2 to < 3 std dev
- > 1 to < 2 std dev
- > 0 to < 1 std dev
- > -1 to < 0 std dev
- > -2 to < -1 std dev
- > -3 to < -2 std dev
- < -3 std dev

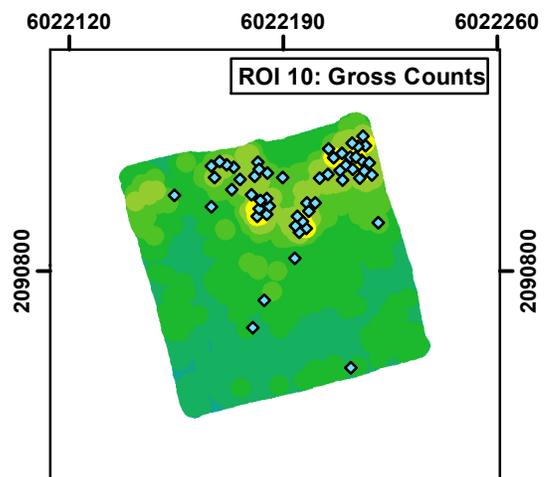
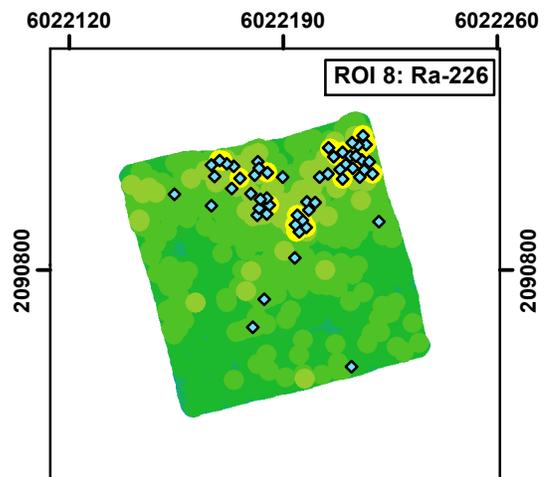
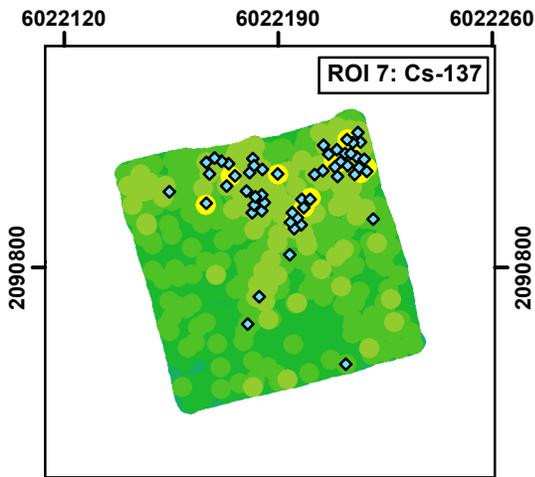
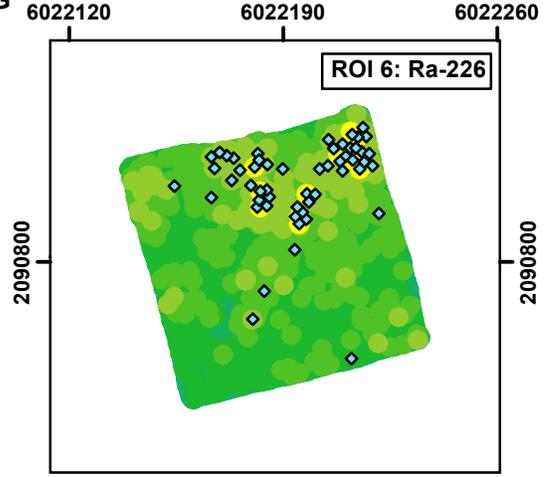
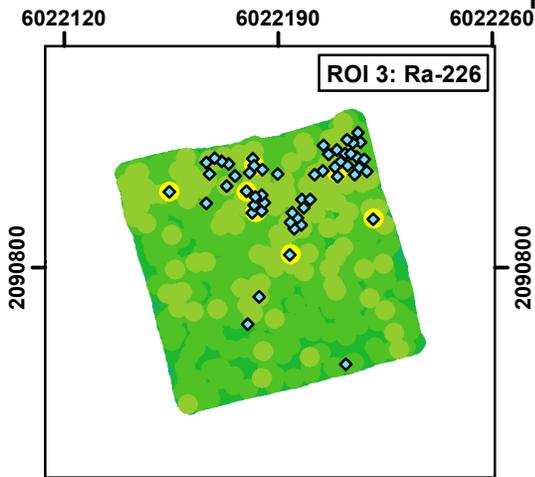


Coordinate system: CSP Zone III, NAD83, US Survey Foot



RSI Data Plots
HPNS Parcel G
RSY 31

TU-153A ESU



RS 700 Gamma Walkover Survey Data (VD1)

- ◆ Follow-Up Location
- > 3 std dev
- > 2 to < 3 std dev
- > 1 to < 2 std dev
- > 0 to < 1 std dev
- > -1 to < 0 std dev
- > -2 to < -1 std dev
- > -3 to < -2 std dev
- < -3 std dev

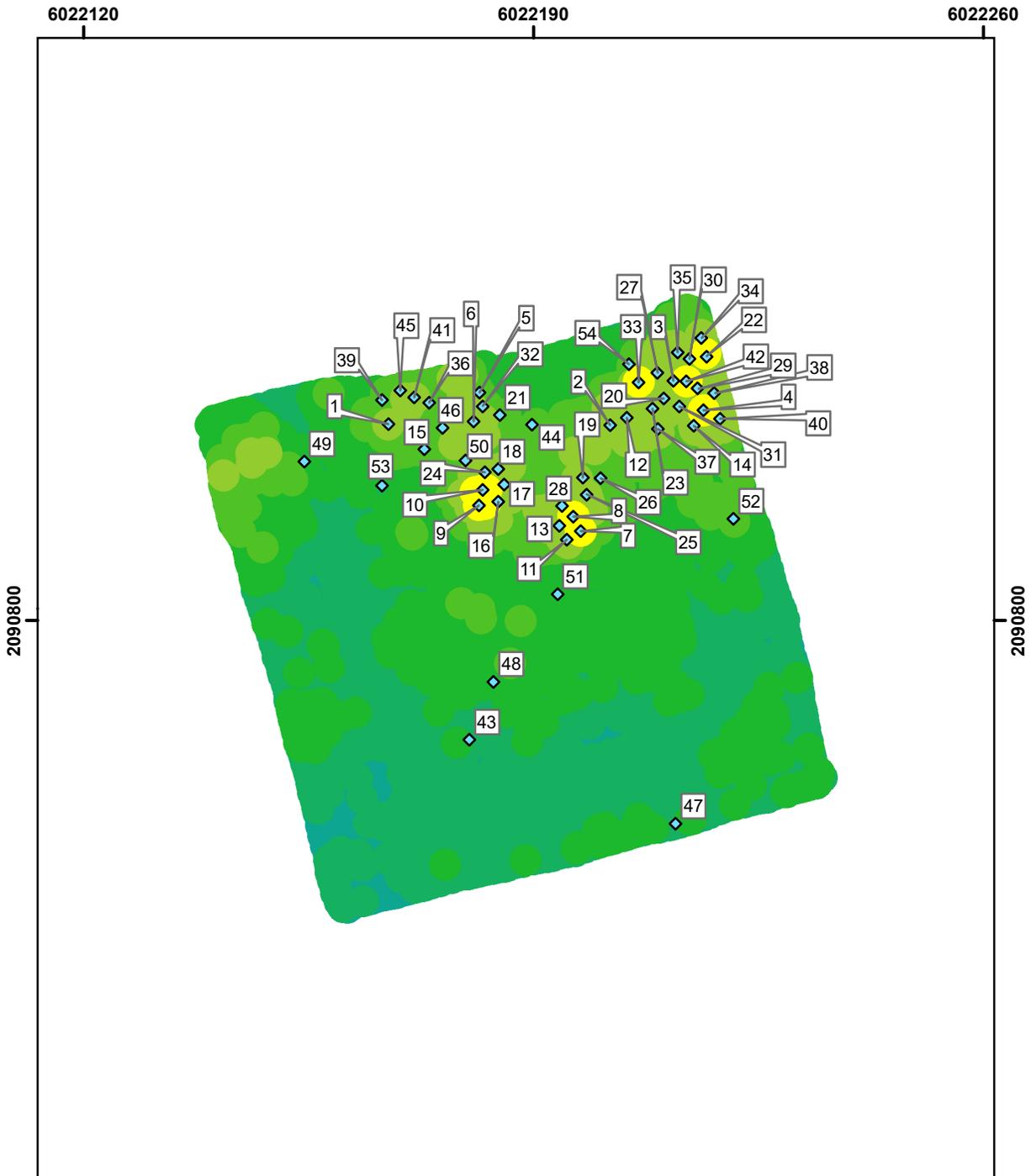


Coordinate system: CSP Zone III, NAD83, US Survey Foot



Follow-Up Static Survey HPNS Parcel G RSY 31 Use 1

TU-153A ESU



RSY 31 Use 1 (VD1, ROI 10 Gross Gamma)

- | | | |
|-----------------------|-----------------------|------------------------|
| ◆ Follow-Up Locations | ● > 1 to < 2 std dev | ● > -2 to < -1 std dev |
| ● > 3 std dev | ● > 0 to < 1 std dev | ● > -3 to < -2 std dev |
| ● > 2 to < 3 std dev | ● > -1 to < 0 std dev | ● < -3 std dev |

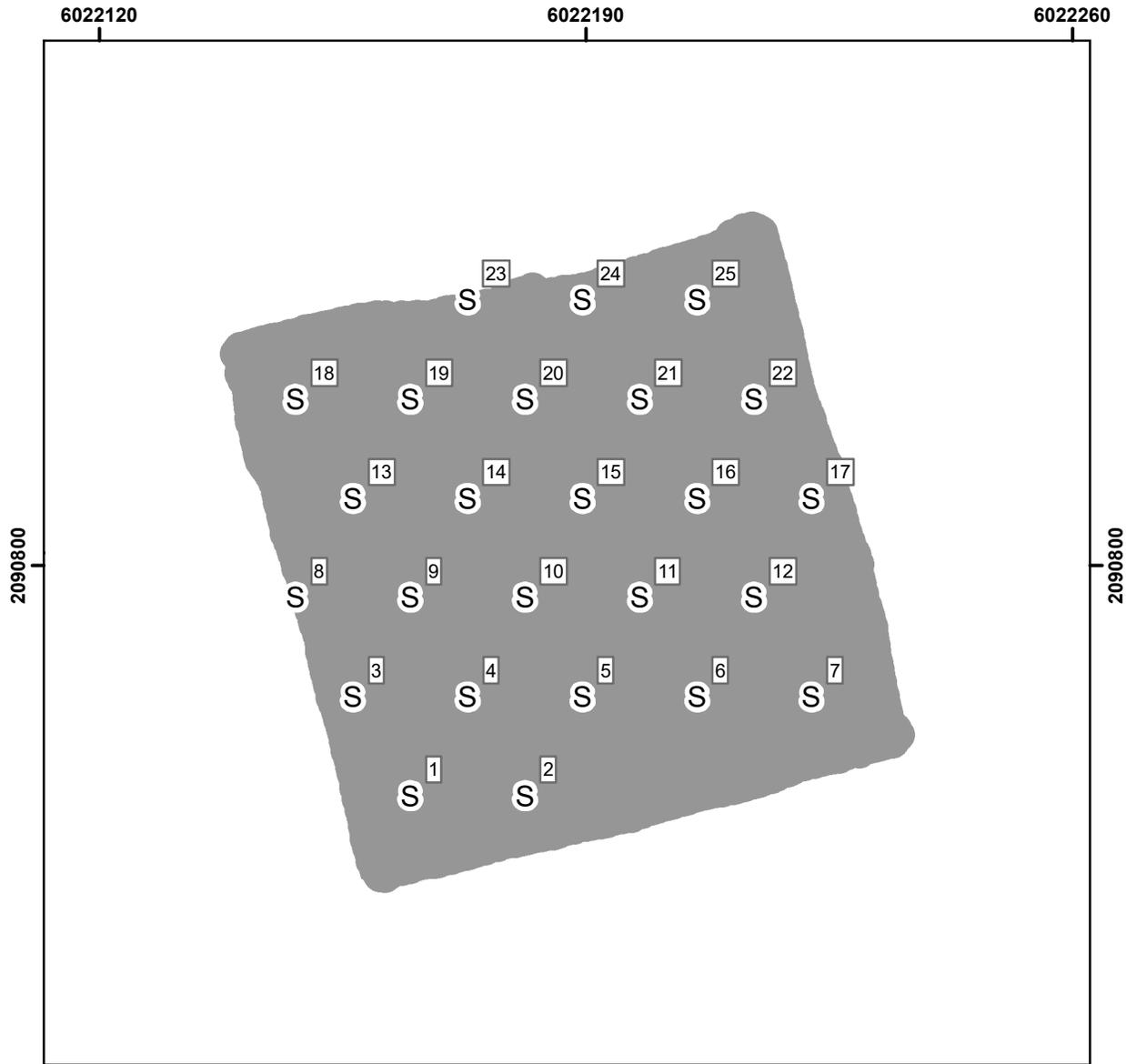
25 12.5 0 25 Feet

Coordinate system: CSP Zone III, NAD83, US Survey Foot



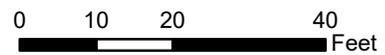
Systematic Sampling HPNS Parcel G RSY 31

TU-153A ESU



RSY 31 Use 1

- S Systematic Sample Locations
- RS-700 GWS Coverage

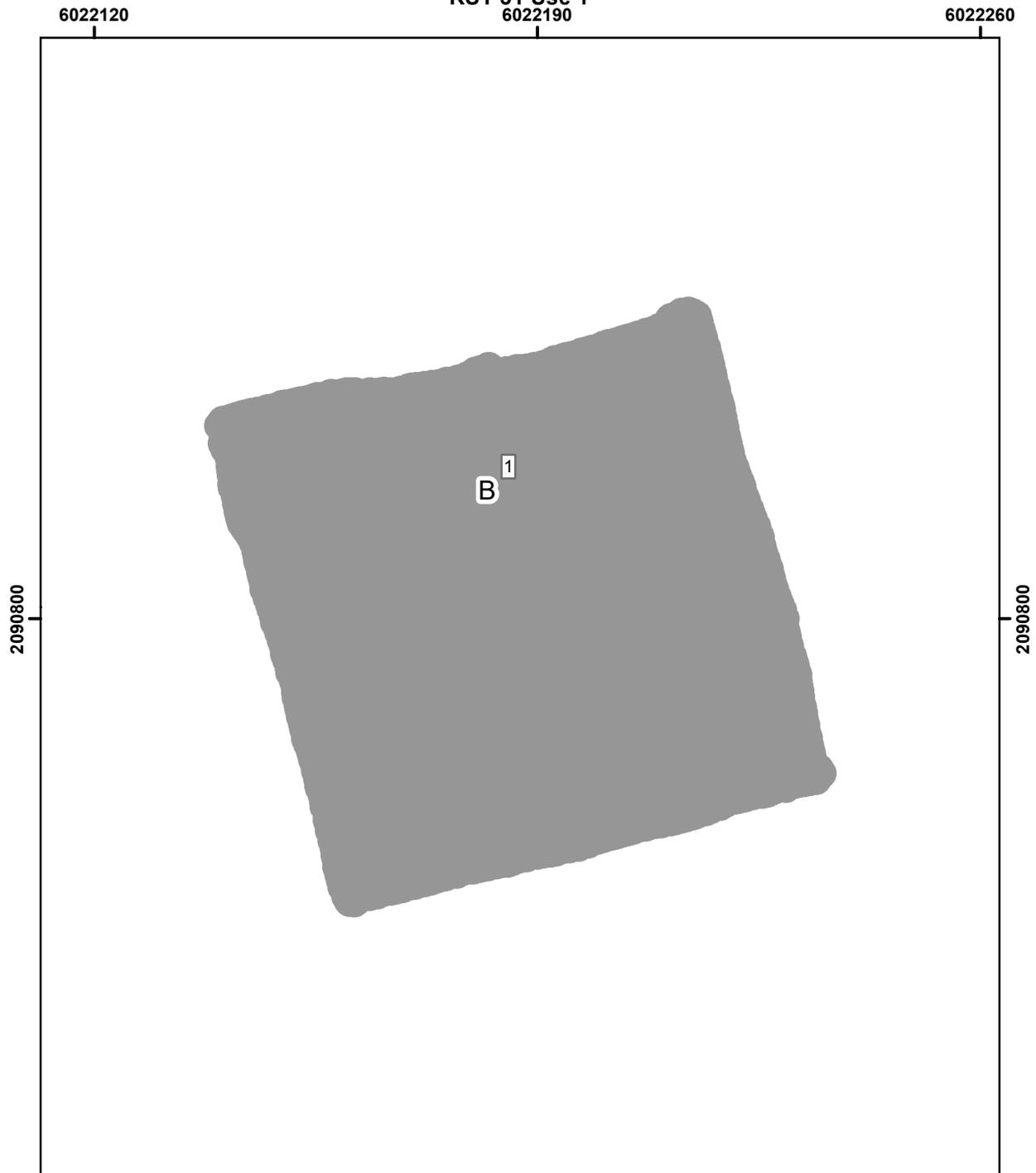


Coordinate system: CSP Zone III, NAD83, US Survey Foot



**Biased Sampling
HPNS Parcel G
RSY 31 Use 1
6022190**

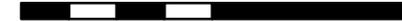
TU-153A ESU



RSY 31 Use 1

- B** Biased Sample Location
- RS-700 GWS Coverage

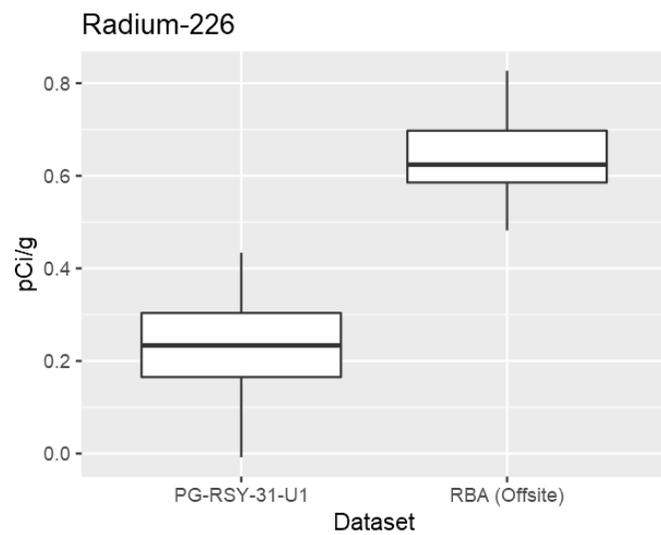
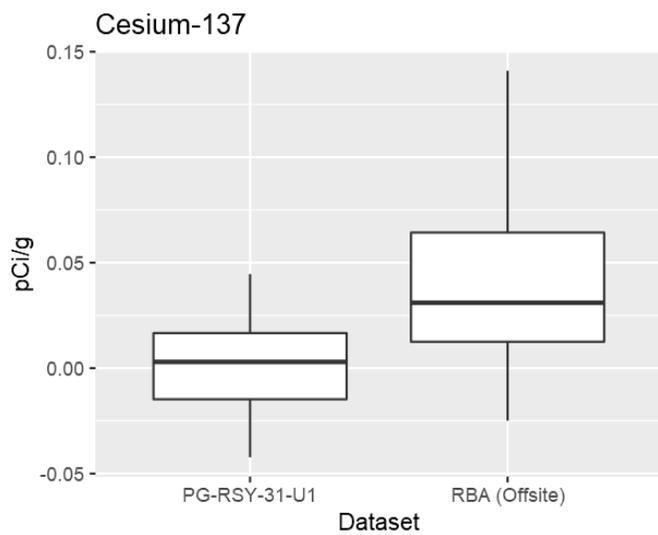
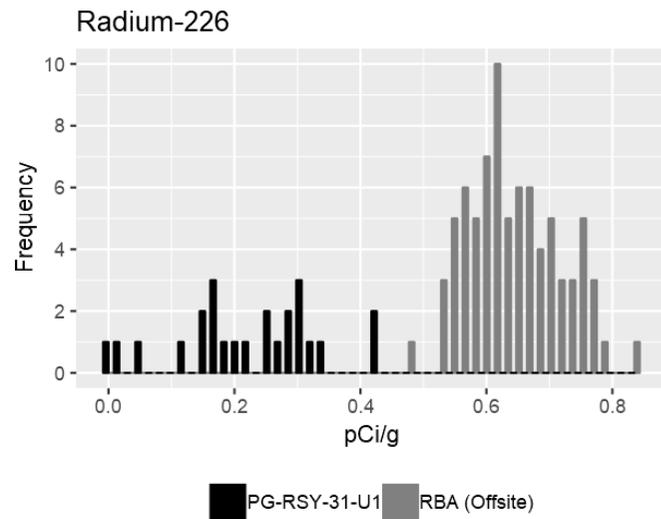
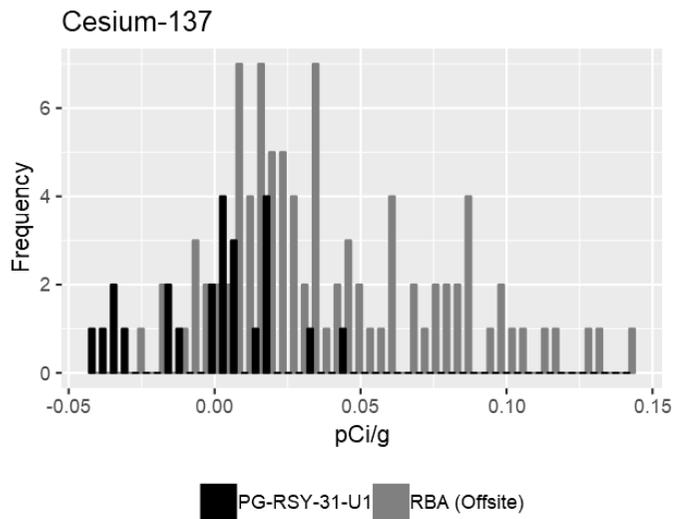
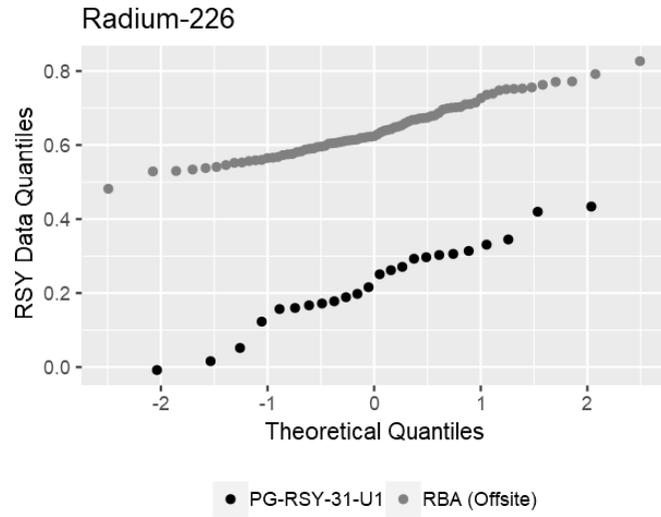
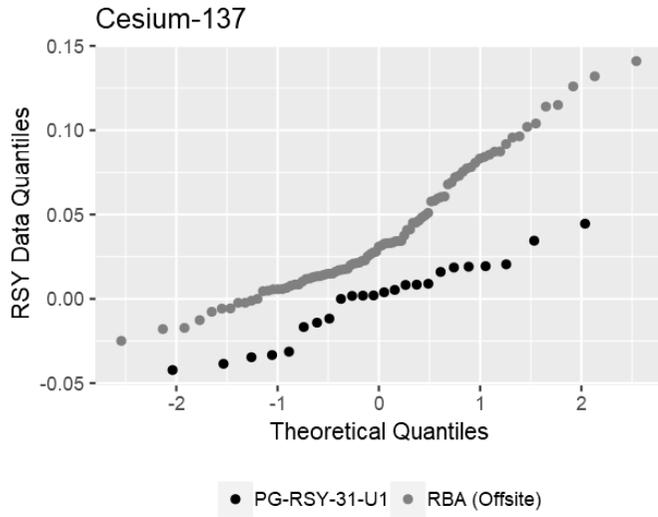
25 12.5 0 25 Feet



Coordinate system: CSP Zone III, NAD83, US Survey Foot



Soil Sample Statistics



WILCOXON RANK SUM TEST

Nuclide: **Ra-226** Location: **RSY 31 Use 1**
 LBGR: **0.251** pCi/g

DOGL: **1**
 LBGR = Median SU Data
 LBGR = **0.251**

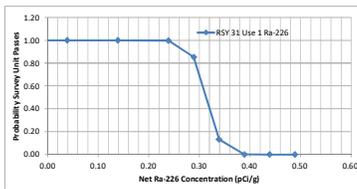
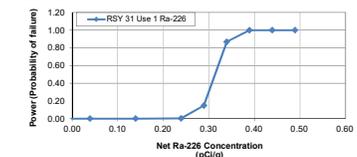
POWER CURVE CALCULATION

DATA	AREA	ADJUSTED DATA	RANKS	SURVEY UNIT	Sorted Ranks	Location Associated with Sorted Rank
0.59	R	0.588	48.5	0	1	S
0.69	R	0.687	101	0	2	S
0.57	R	0.566	40	0	3	S
0.64	R	0.635	78.5	0	4	S
0.61	R	0.606	58	0	5	S
0.65	R	0.653	87.5	0	6	S
0.61	R	0.613	62	0	7	S
0.71	R	0.711	109	0	8	S
0.68	R	0.68	99.5	0	9	S
0.61	R	0.608	59	0	10	S
0.54	R	0.541	31	0	11	S
0.59	R	0.588	48.5	0	12	S
0.67	R	0.673	96	0	13.5	S
0.67	R	0.674	97	0	13.5	S
0.48	R	0.482	28	0	15	S
0.76	R	0.763	121	0	16	S
0.75	R	0.748	115	0	17	S
0.56	R	0.56	37.5	0	18	S
0.61	R	0.614	64	0	19	S
0.53	R	0.529	27	0	20	S
0.61	R	0.605	57	0	21	S
0.58	R	0.575	44	0	22	S
0.67	R	0.672	95	0	23	S
0.56	R	0.559	38	0	24	S
0.68	R	0.664	90.5	0	25	S
0.55	R	0.546	32	0	26	R
0.74	R	0.739	114	0	27	R
0.74	R	0.736	113	0	28	R
0.60	R	0.604	56	0	29	R
0.70	R	0.701	105	0	30	R
0.59	R	0.589	104	0	31	R
0.70	R	0.699	104	0	32	R
0.62	R	0.624	73.5	0	33	R
0.58	R	0.583	43	0	34	R
0.57	R	0.573	43	0	35	R
0.62	R	0.623	71	0	36	R
0.60	R	0.598	55	0	37.5	R
0.64	R	0.643	84	0	37.5	R
0.55	R	0.553	34	0	39	R
0.75	R	0.751	116.5	0	40	R
0.77	R	0.771	122	0	41.5	R
0.72	R	0.715	110.5	0	41.5	R
0.62	R	0.62	68	0	43	R
0.71	R	0.71	108	0	44	R
0.58	R	0.581	46	0	45	R
0.60	R	0.595	53	0	46	R
0.58	R	0.58	37.5	0	47	R
0.75	R	0.751	116.5	0	48.5	R
0.67	R	0.669	93.5	0	48.5	R
0.62	R	0.619	67.5	0	49.5	R
0.64	R	0.641	82.5	0	50.5	R
0.59	R	0.59	50.5	0	52	R
0.61	R	0.614	64	0	53	R
0.65	R	0.653	87.5	0	54	R
0.58	R	0.576	45	0	55	R
0.62	R	0.622	69.5	0	56	R
0.57	R	0.565	39	0	57	R
0.63	R	0.629	76.5	0	58	R
0.64	R	0.641	82.5	0	59	R
0.61	R	0.614	64	0	60	R
0.66	R	0.664	90.5	0	61	R
0.77	R	0.772	123	0	62	R
0.64	R	0.639	80.5	0	64	R
0.62	R	0.624	73.5	0	64	R
0.61	R	0.612	61	0	64	R
0.65	R	0.648	85	0	66	R
0.55	R	0.552	33	0	67	R
0.62	R	0.624	73.5	0	68	R
0.62	R	0.616	69.5	0	69.5	R
0.64	R	0.635	78.5	0	69.5	R
0.70	R	0.703	107	0	71	R
0.53	R	0.53	28.5	0	73.5	R
0.73	R	0.727	112	0	73.5	R
0.62	R	0.624	73.5	0	73.5	R
0.65	R	0.65	80.5	0	75	R
0.67	R	0.668	92	0	76.5	R
0.54	R	0.538	30	0	76.5	R
0.57	R	0.568	41.5	0	76.5	R
0.60	R	0.596	54	0	76.5	R
0.59	R	0.591	52	0	80.5	R
0.68	R	0.678	98	0	80.5	R
0.67	R	0.669	93.5	0	82.5	R
0.79	R	0.792	124	0	82.5	R
0.75	R	0.752	118	0	84	R
0.56	R	0.557	35	0	85	R
0.62	R	0.622	69.5	0	86	R
0.70	R	0.702	106	0	87.5	R
0.64	R	0.639	80.5	0	87.5	R
0.76	R	0.756	120	0	89	R
0.70	R	0.696	102.5	0	90.5	R
0.72	R	0.715	110.5	0	90.5	R
0.66	R	0.659	89	0	92	R
0.70	R	0.696	102.5	0	93.5	R
0.63	R	0.629	76.5	0	93.5	R
0.68	R	0.68	99.5	0	95	R
0.53	R	0.534	29	0	96	R
0.61	R	0.61	60	0	97	R
0.83	R	0.827	125	0	98	R
0.75	R	0.753	119	0	99.5	R
0.57	R	0.568	41.5	0	99.5	R
0.0161	S	-0.2349	2	2	101	R
0.0518	S	-0.1892	3	3	102.5	R
0.167	S	-0.084	7	7	102.5	R
0.198	S	-0.053	11	11	104	R
0.297	S	0.046	18	18	105	R
0.197	S	-0.094	5	5	106	R
0.172	S	-0.079	8	8	107	R
0.306	S	0.055	20	20	108	R
0.261	S	0	13.5	13.5	109	R
0.178	S	-0.073	9	9	110.5	R
0.331	S	0.08	22	22	110.5	R
0.271	S	0.02	16	16	112	R
-0.00787	S	-0.25887	1	1	113	R
0.16	S	-0.091	6	6	114	R
0.189	S	-0.062	10	10	115	R
0.282	S	0.011	15	15	116.5	R
0.216	S	-0.035	12	12	116.5	R
0.42	S	0.169	24	24	119	R
0.303	S	0.052	19	19	119	R
0.434	S	0.183	25	25	120	R
0.123	S	-0.128	4	4	121	R
0.314	S	0.063	21	21	122	R
0.293	S	0.042	17	17	123	R
0.251	S	0	13.5	13.5	124	R
0.345	S	0.094	23	23	125	R
Sum =			7876	325		

Statistic	Value	Parameter
Count	25	m
SD	0.112	
Median	0.251	
Ref Stats	1	n
Count	100	n
SD	0.073	
Critical Value	1951.9	

Parameter	Value
Number of Samples	25
LBGR	0.251
Av	6.70
Pv	1
N	25.23
N/Z	13
Actual N	25
SU σ	0.112
Z(1-alpha)	2.326
Z(1-beta)	1.645

Concentration (C)	above Background (C-LBGR)	SD	p1	p2	E(Wmw)	Var(Wmw)	SD(Wmw)	z	Power	Probability of passing
0.7	-0.16	-3.7	0.00668	0.00074	16.66	229.8282	15.16009	106.18	0.00	1.00
0.75	-0.11	-3.2	0.01695	0.00269	42.3675	780.5102	27.93761	56.8973	0.00	1.00
0.8	-0.06	-2.8	0.01695	0.00269	42.3675	780.5102	27.93761	56.8973	0.00	1.00
0.85	-0.01	-2.3	0.03855	0.00947	96.375	2238.871	47.31459	32.3363	0.00	1.00
0.9	0.04	-1.9	0.08956	0.02771	223.888	6259.712	79.11634	17.262	0.00	1.00
1	0.14	-1.0	0.23975	0.11520	599.375	17590.17	132.6279	7.74332	0.00	1.00
1.1	0.24	-0.1	0.47181	0.30561	1179.54	26144.76	161.6934	2.76338	0.00	1.00
1.15	0.29	0.3	0.58400	0.42142	1460	25318.47	158.1178	1.04552	0.15	0.85
1.2	0.34	0.8	0.71420	0.57447	1785.49	20311.17	142.5173	-1.1166	0.87	0.13
1.25	0.39	1.2	0.80193	0.68880	2004.82	14760.88	121.4944	-3.1151	1.00	0.00
1.3	0.44	1.7	0.88533	0.81002	2213.34	8310.205	91.16032	-6.439	1.00	0.00
1.35	0.49	2.1	0.93122	0.93153	2326.05	4575.838	67.64495	-10.373	1.00	0.00



QUANTILE TEST

From NUREG 1505, Table A.7b. Values of r and k for the Quantile Test When α is Approximately 0.025

Parameter	Value
n (number of survey unit measurements)	25
m (number of reference area measurements)	100
Use:	
m =	100
n =	25
r	4
k	3
alpha	0.025

If k or more of the r largest measurements in the combined ranked data set are from the survey unit, the null hypothesis of the Quantile test (that there is no residual radioactivity above the LBGR in any part of the survey unit) is rejected.

0 of the largest 4 adjusted measurements are from S. The null hypothesis is accepted.

Statistic	Value	Parameter
# of R:	100	n
# of S:	25	m
Avg Rank R:	73.5	
Avg Rank S:	13	

For m or n greater than 20, the critical value (k) can be calculated from

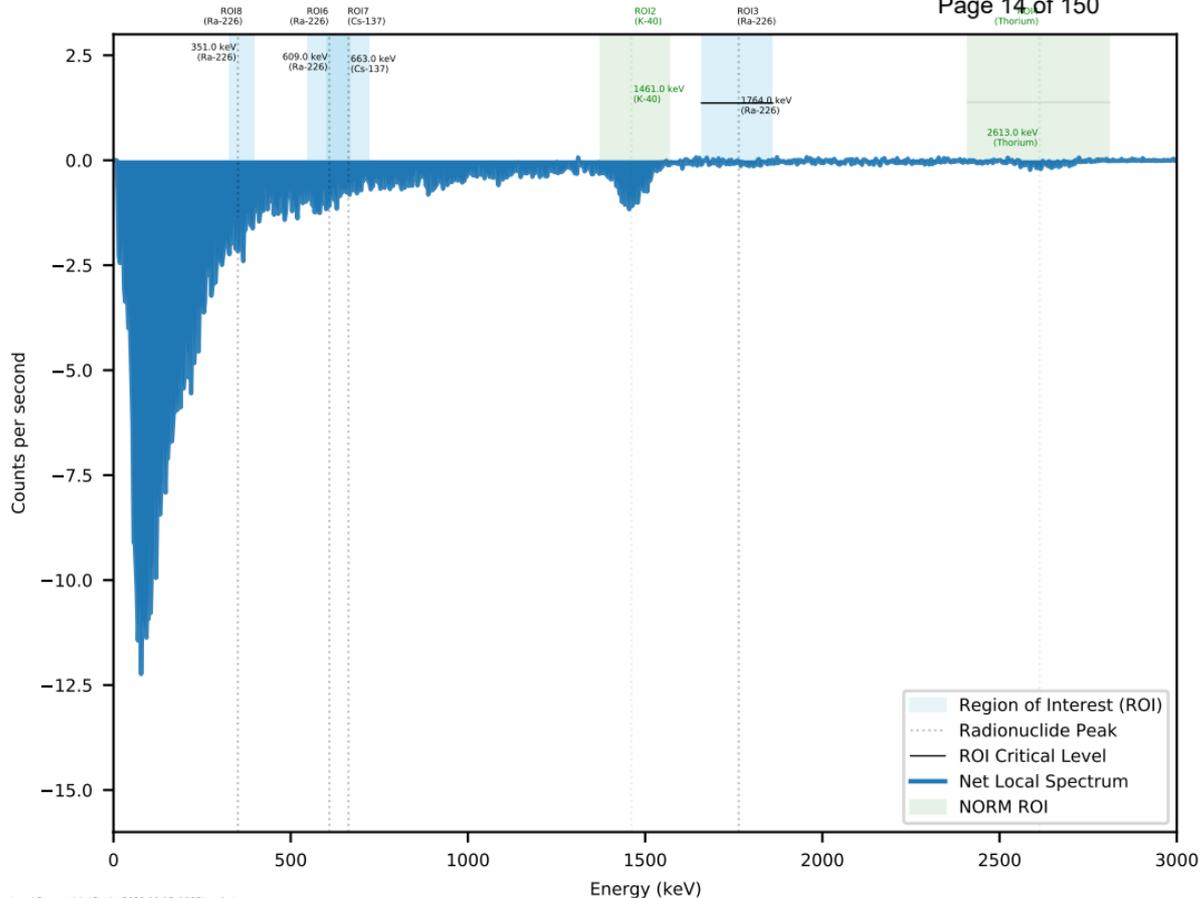
$$\frac{m(n+m+1)}{2} + z \sqrt{\frac{nm(n+m+1)}{12}}$$

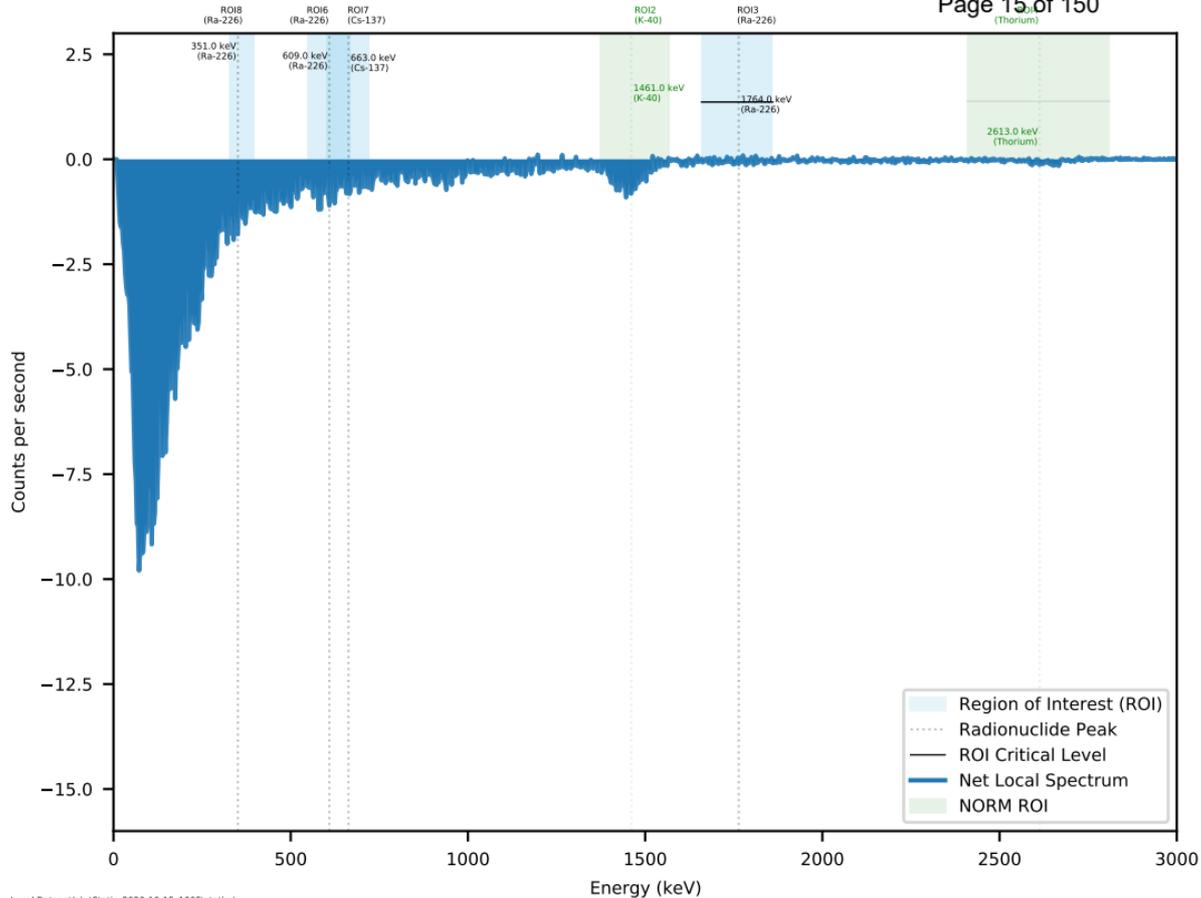
z = 99.0% percentile of standard normal distribution = 2

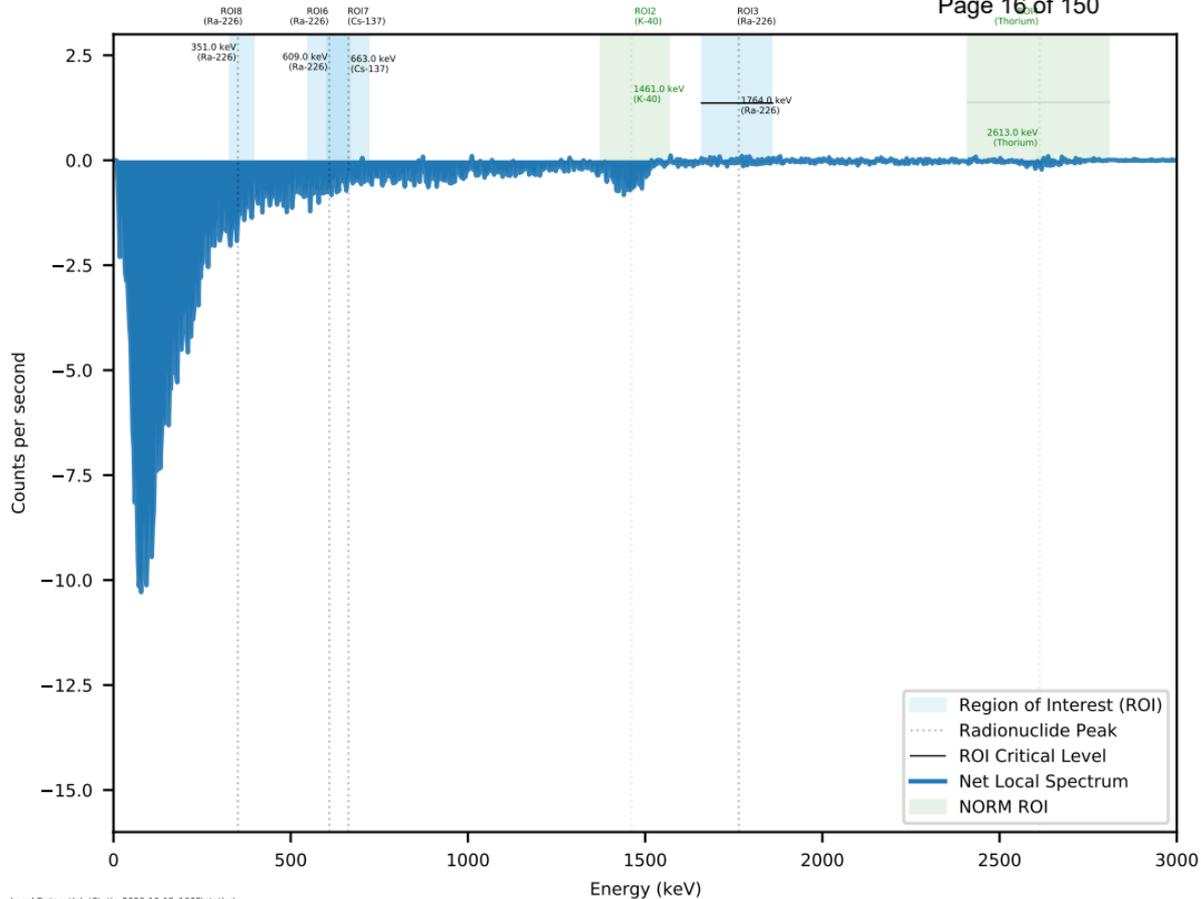
k = 1951.9

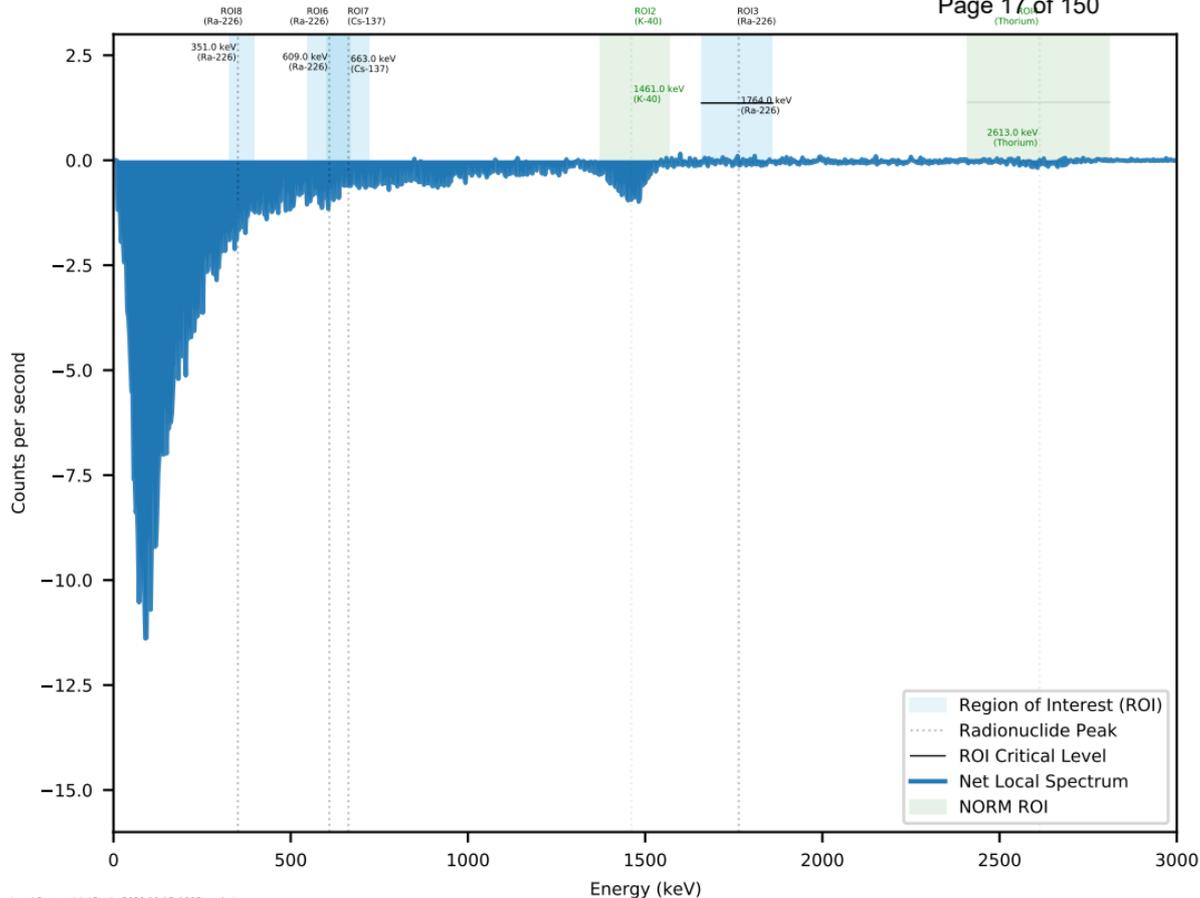
α = 0.025 = 0.01
 β = 0.05

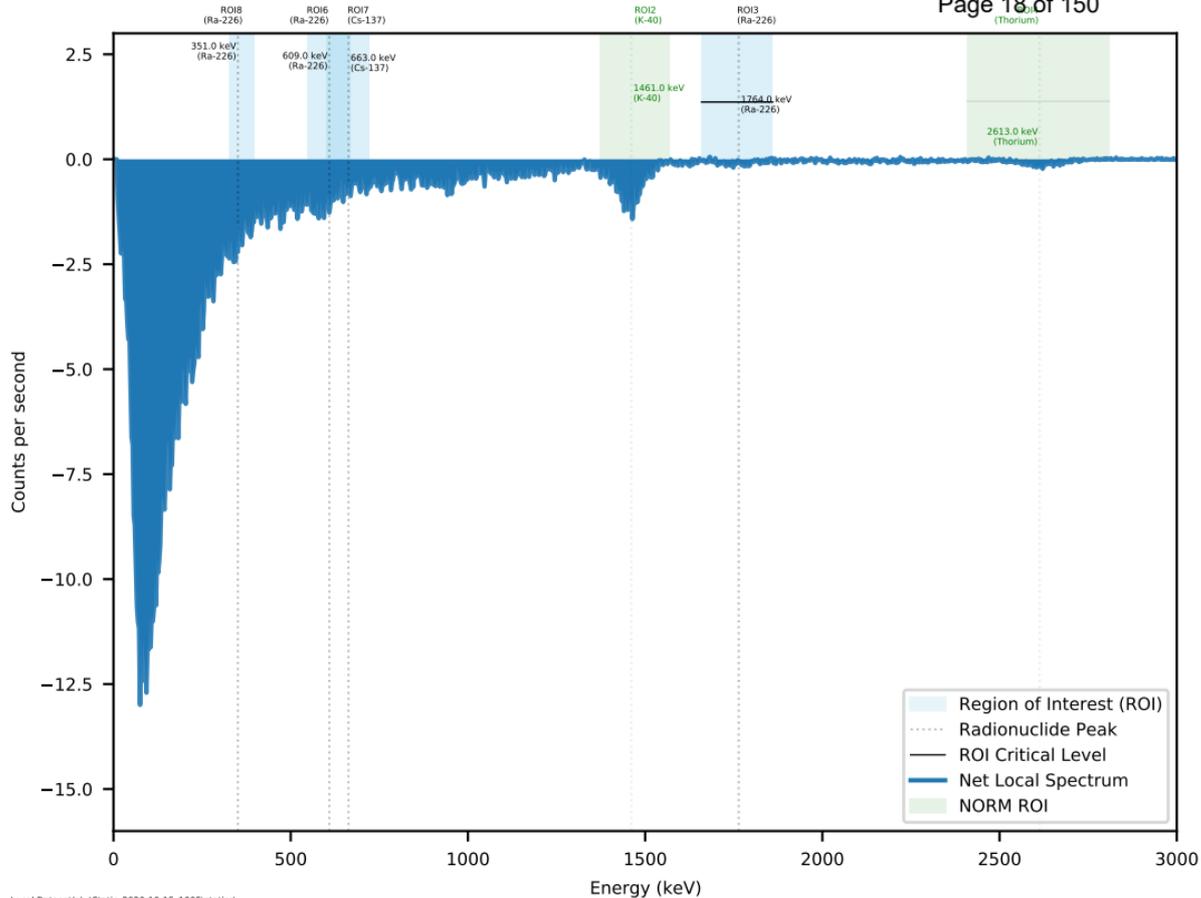
Since the sum of survey unit ranks is less than the critical value, the null hypothesis that the survey unit concentrations do not exceed the LBGR is accepted (i.e., survey unit passes).

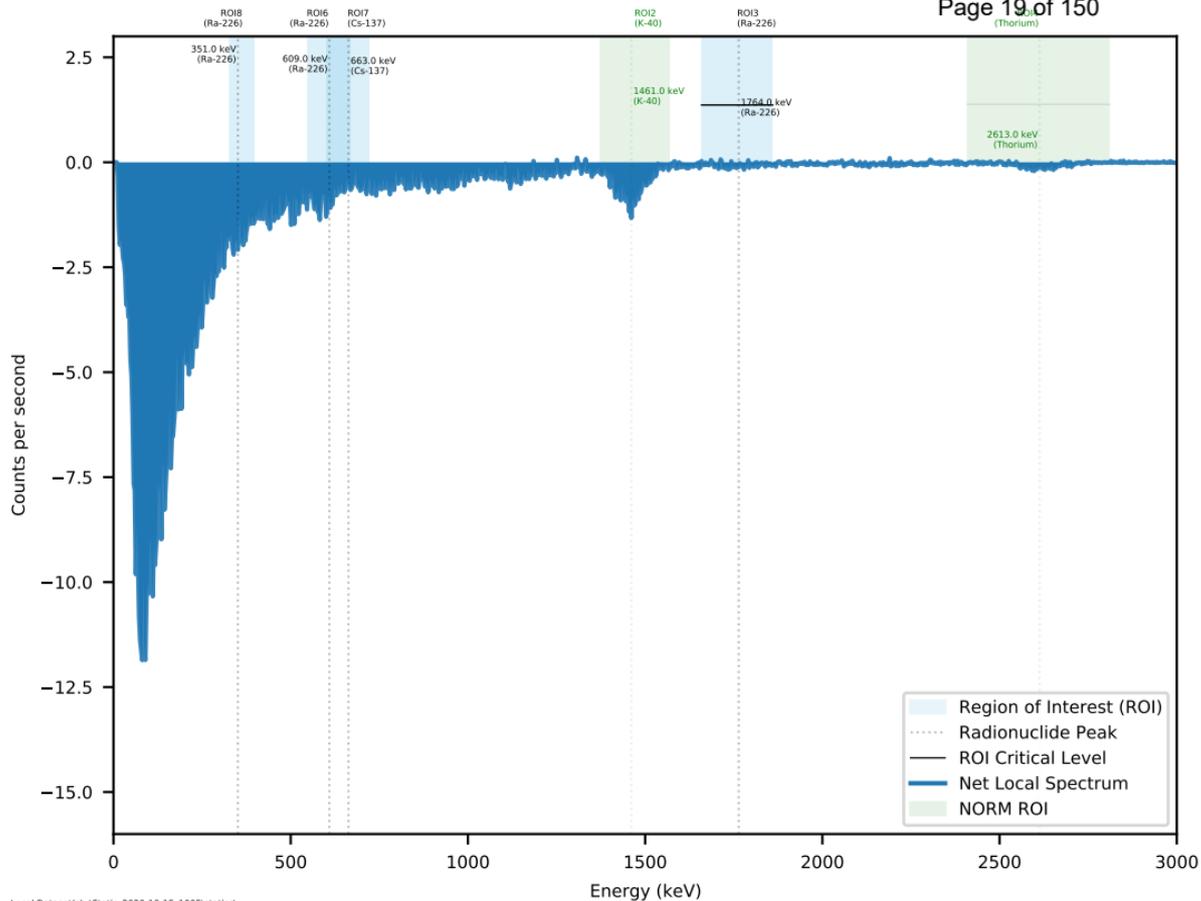


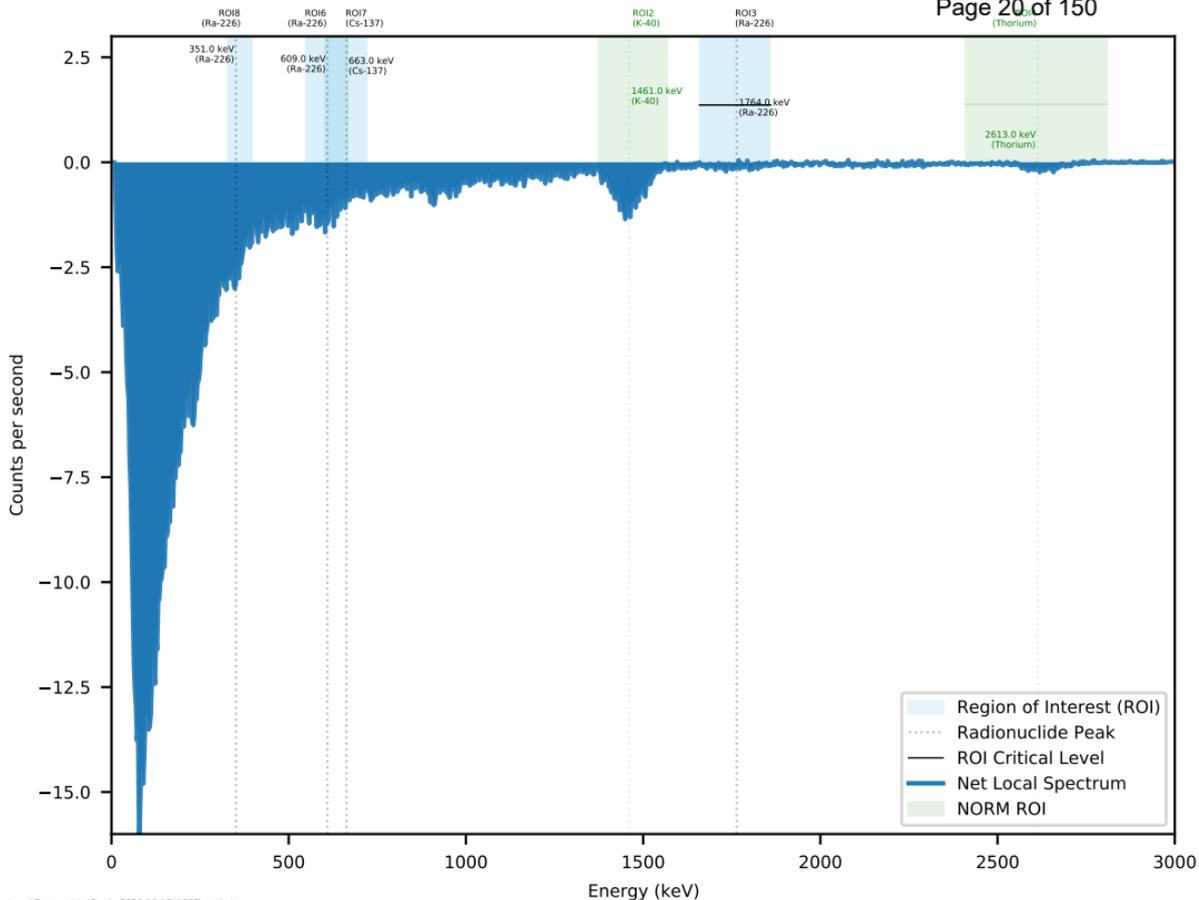


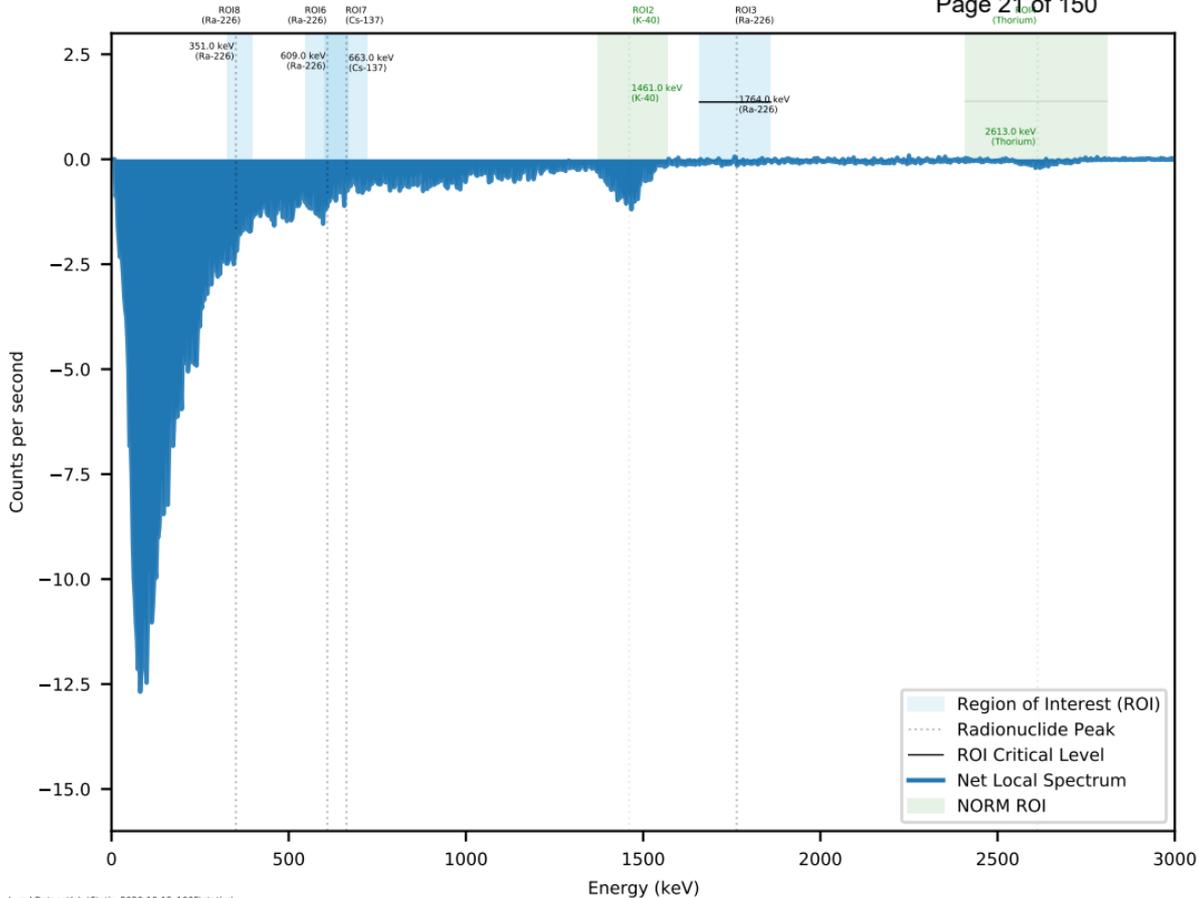


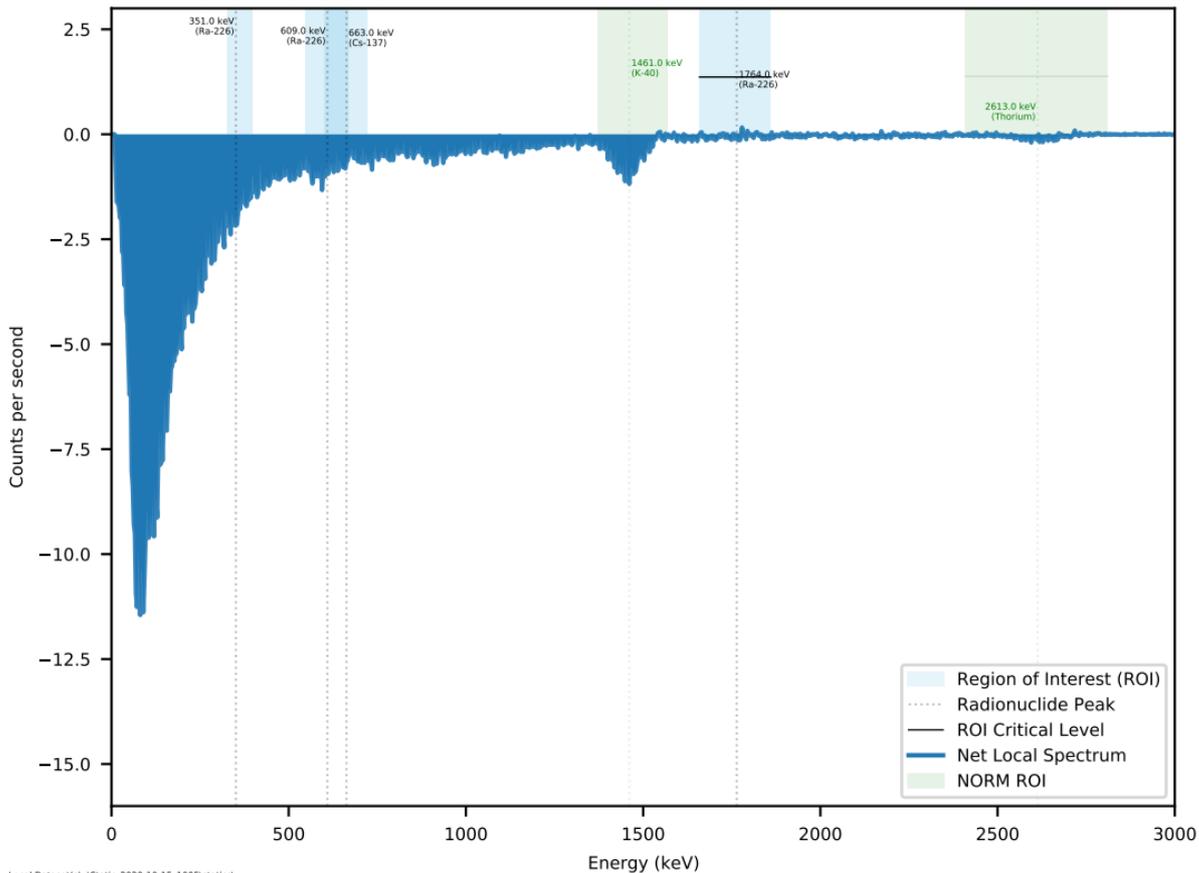


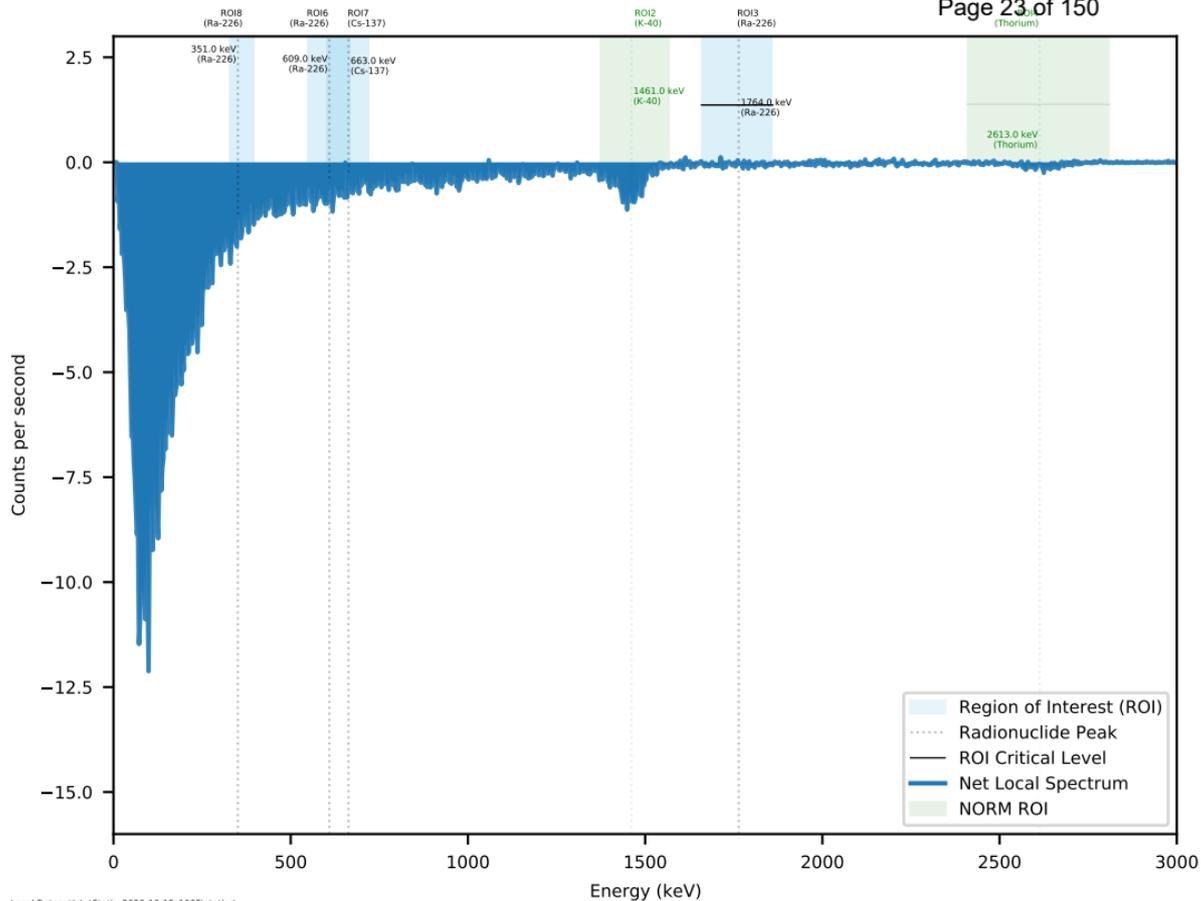


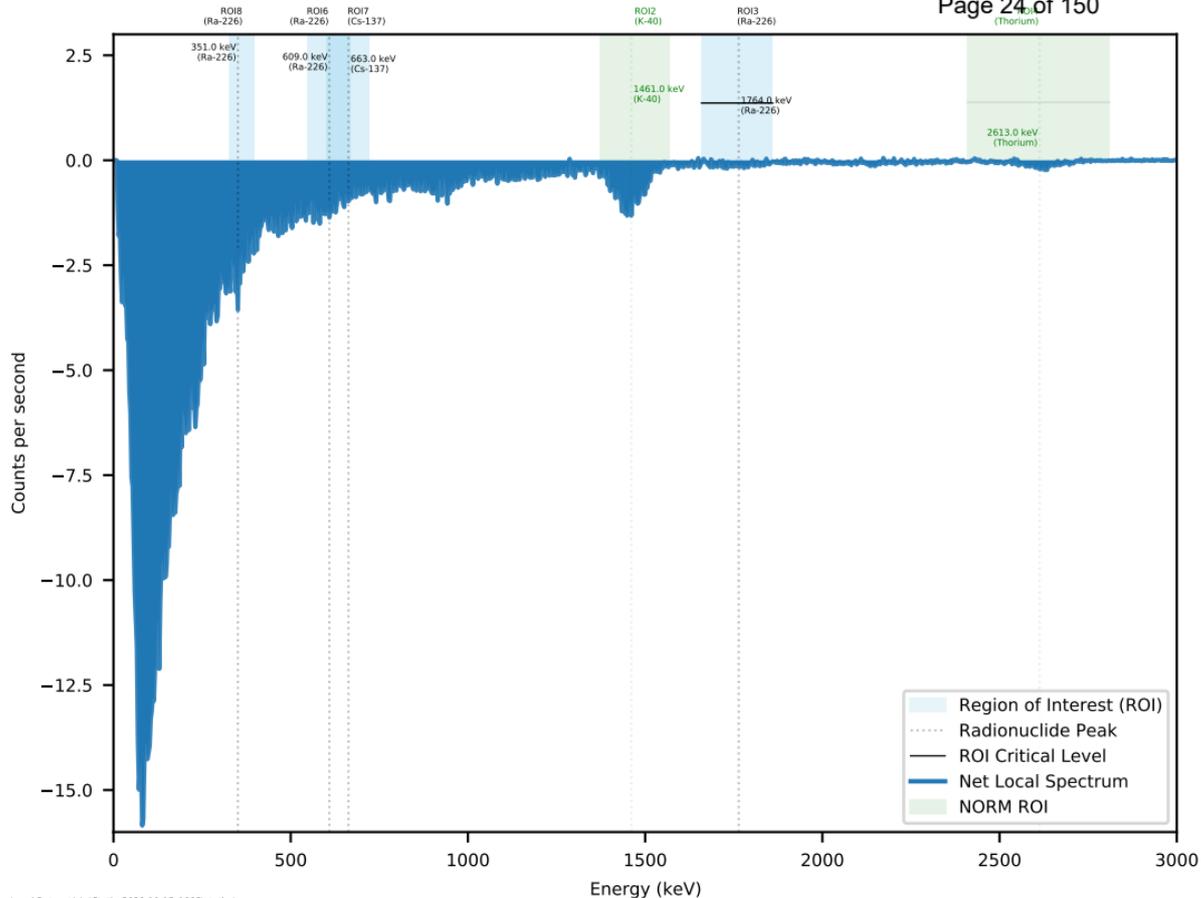


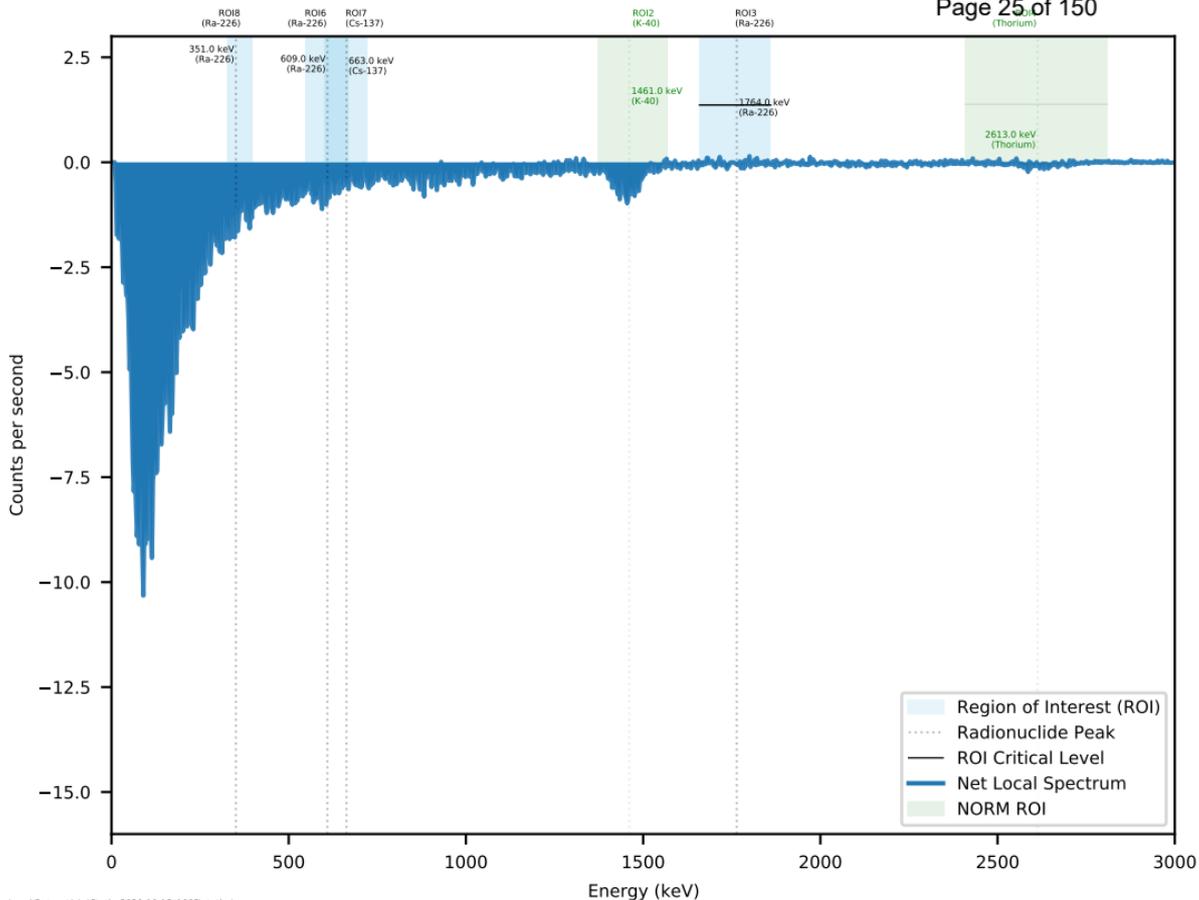


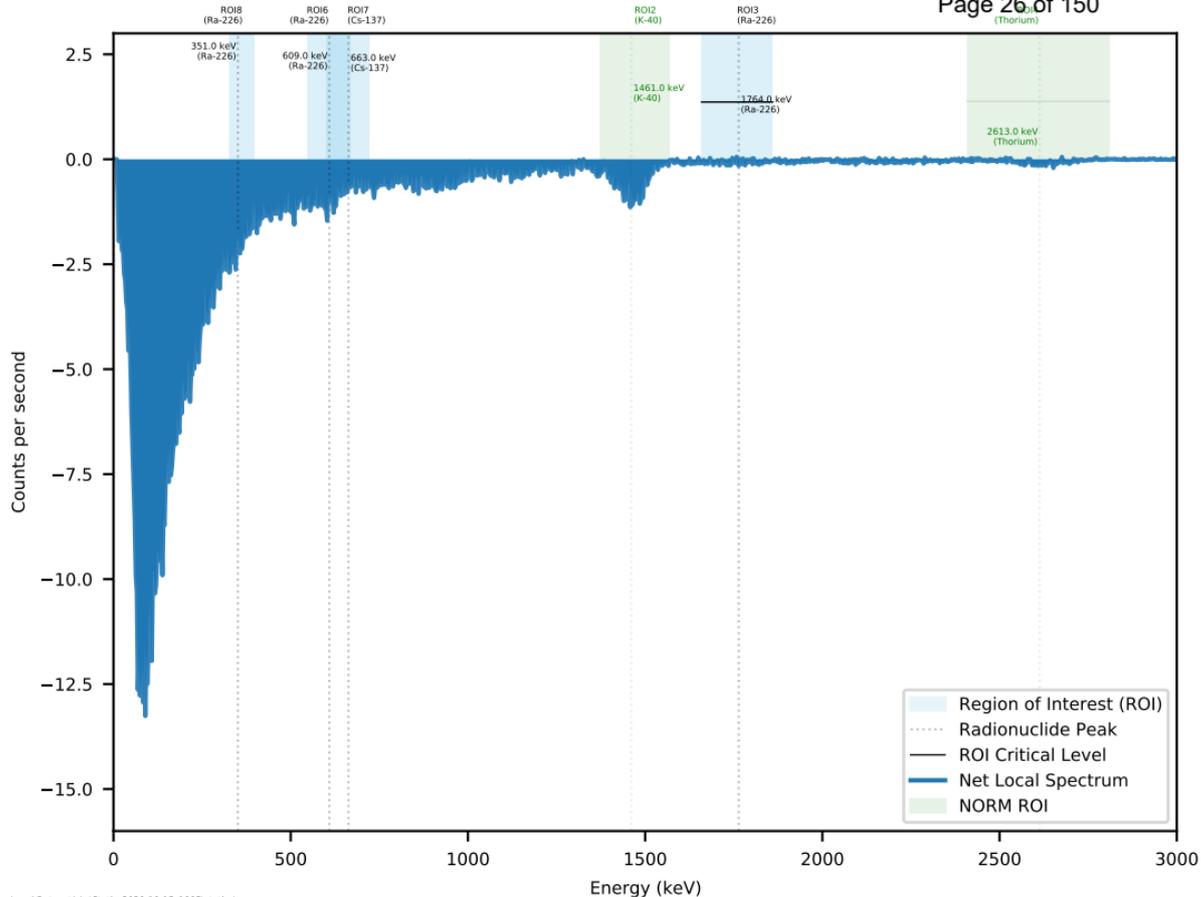


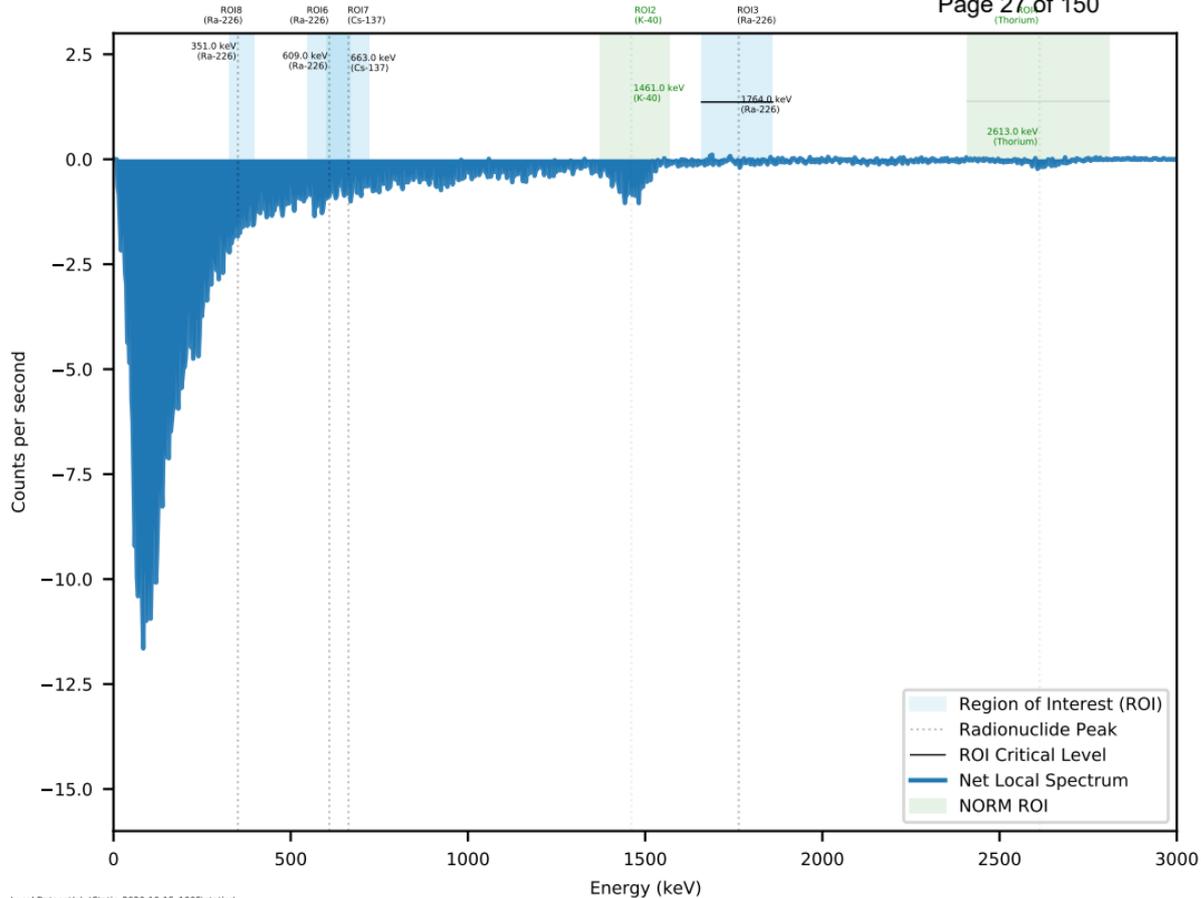


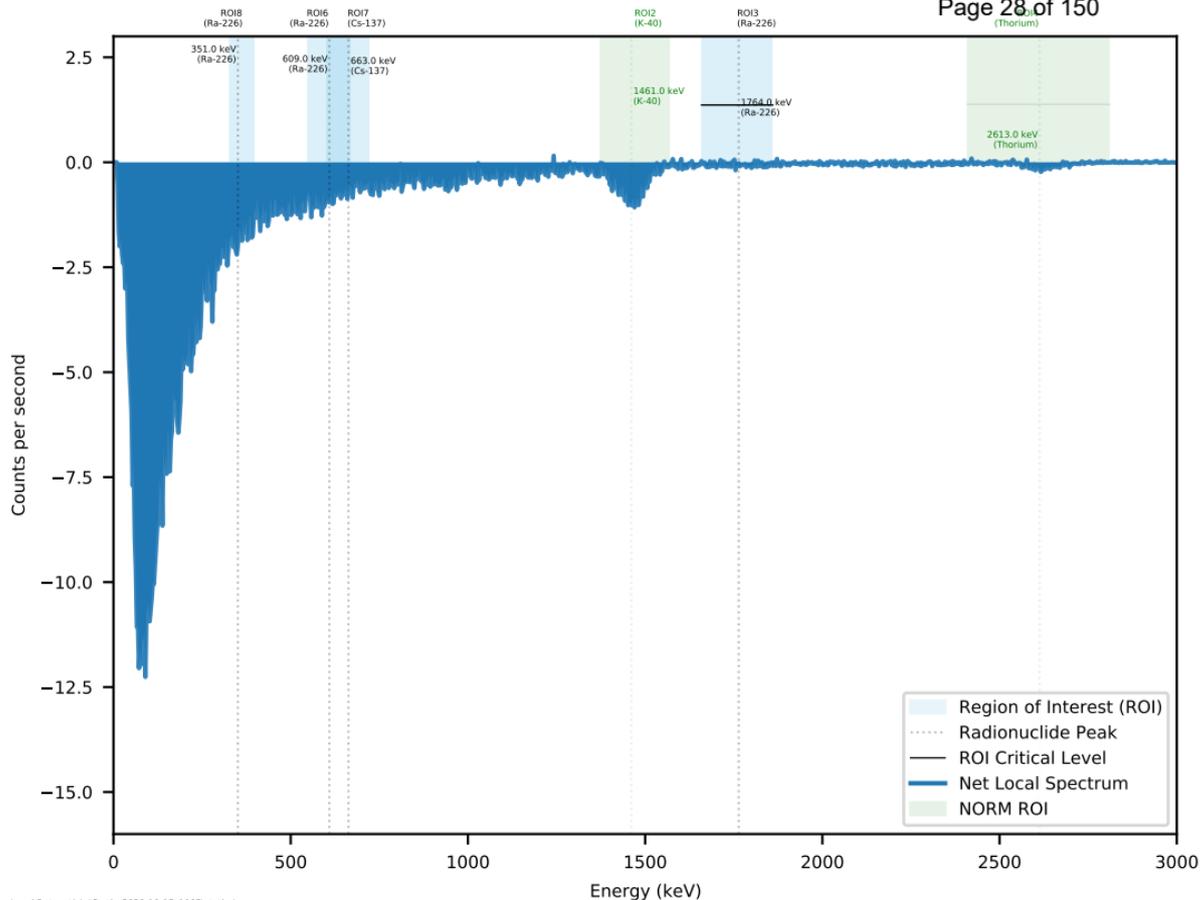


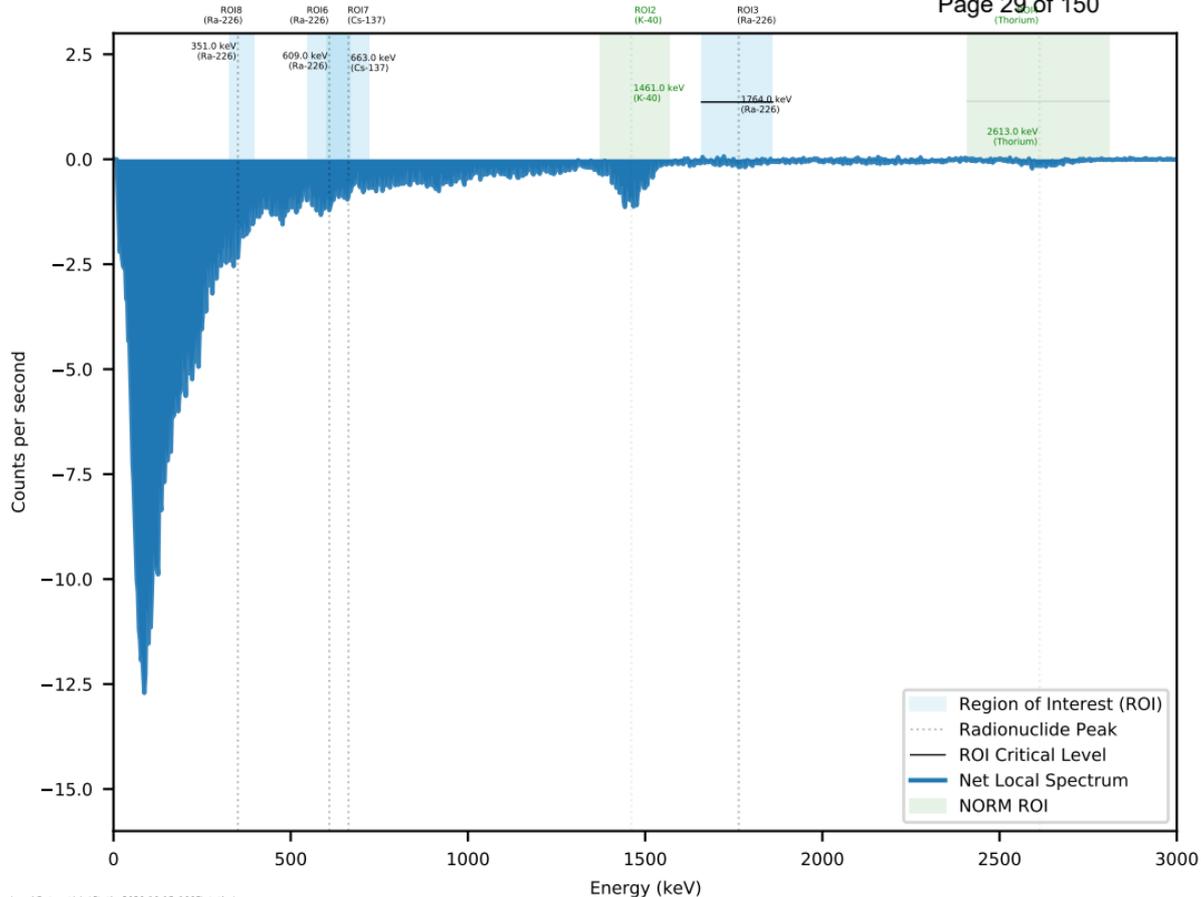


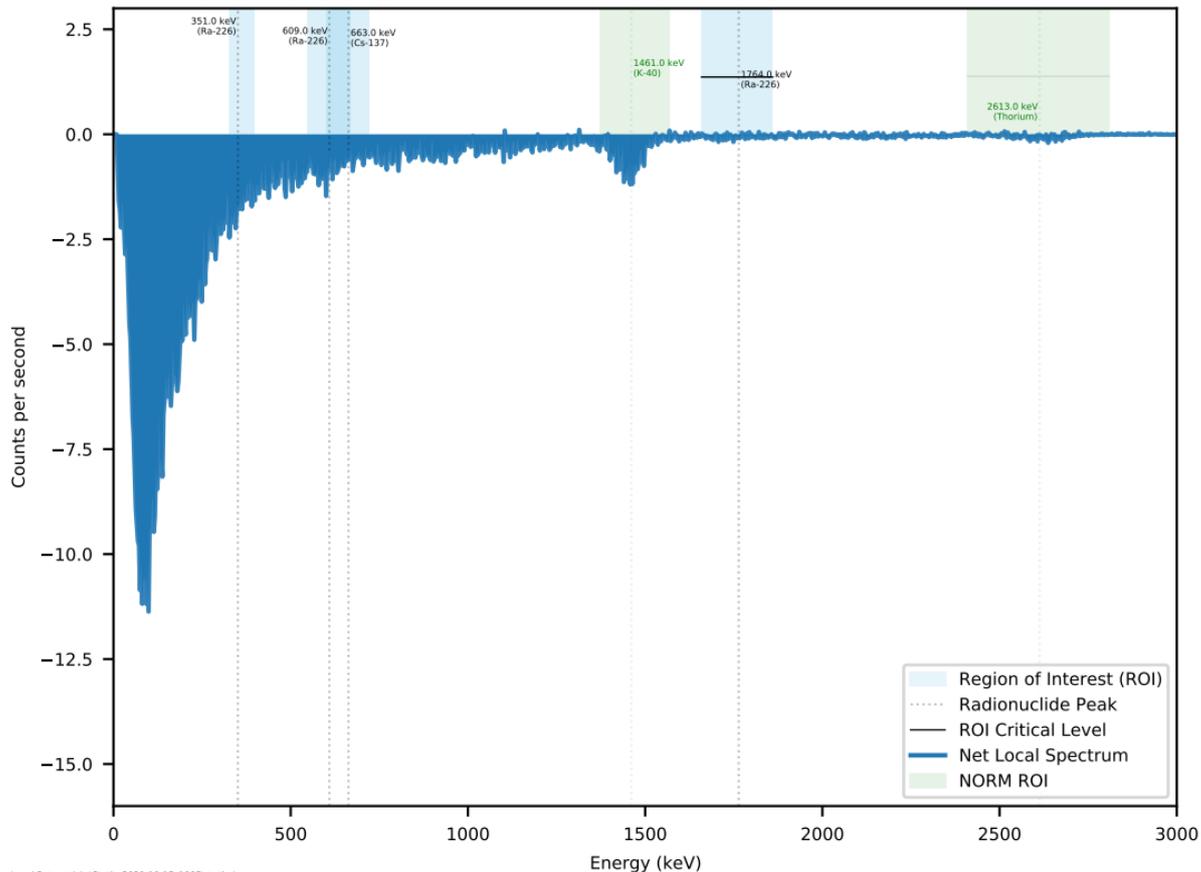


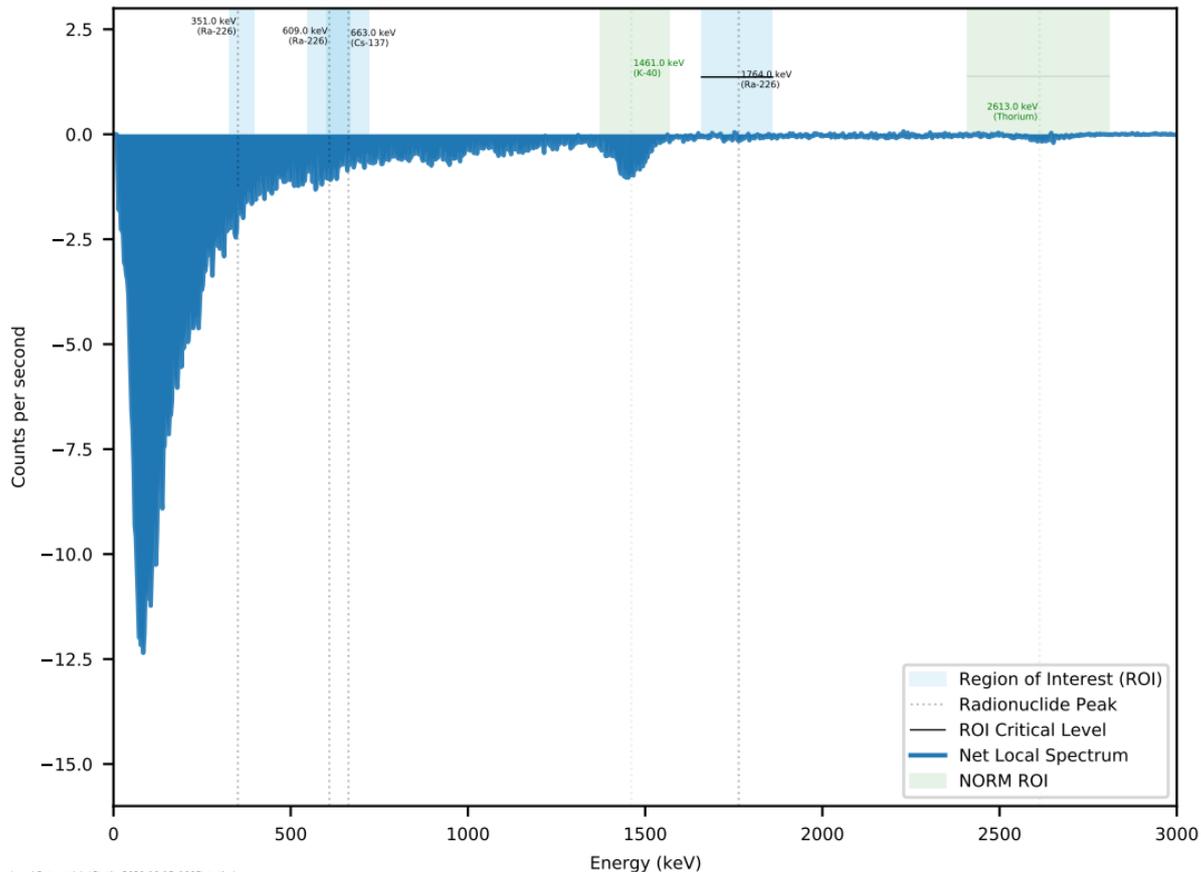


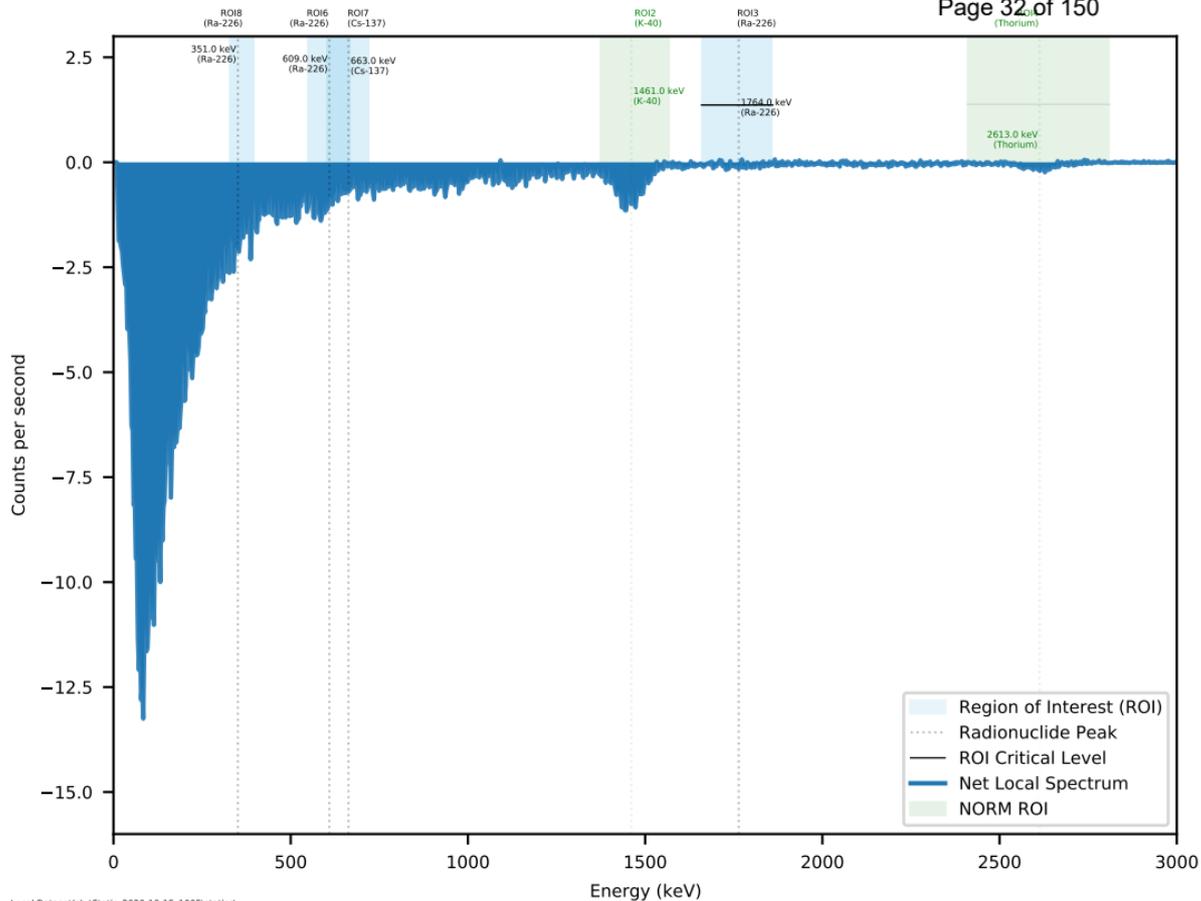


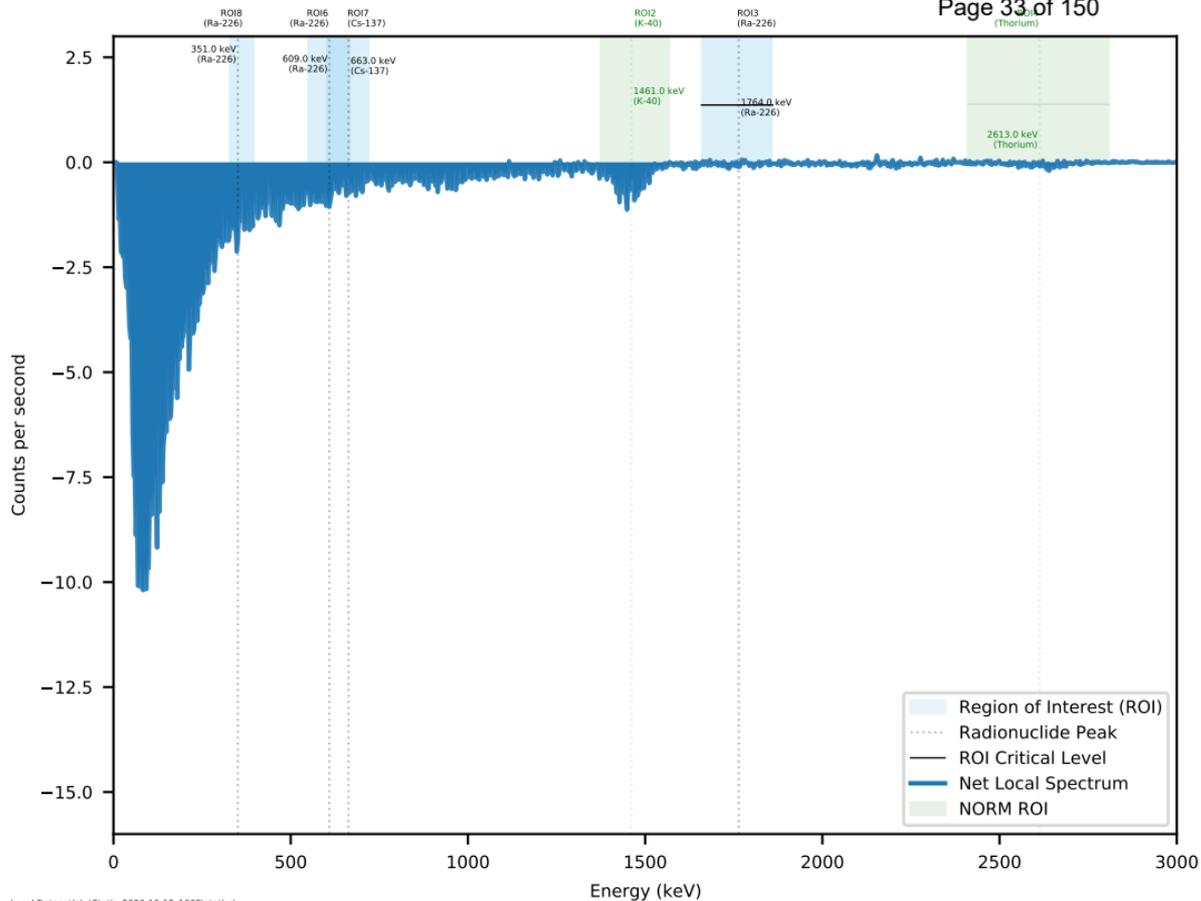


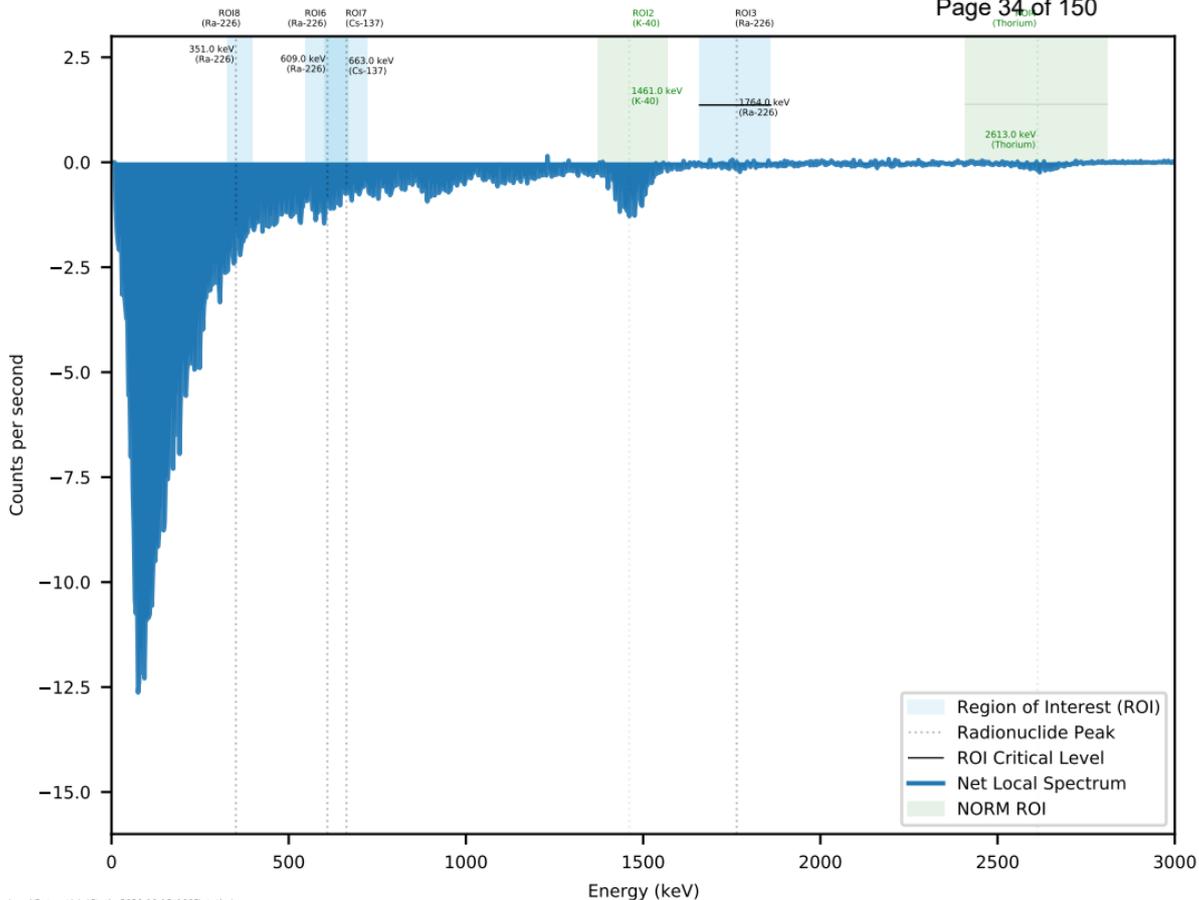


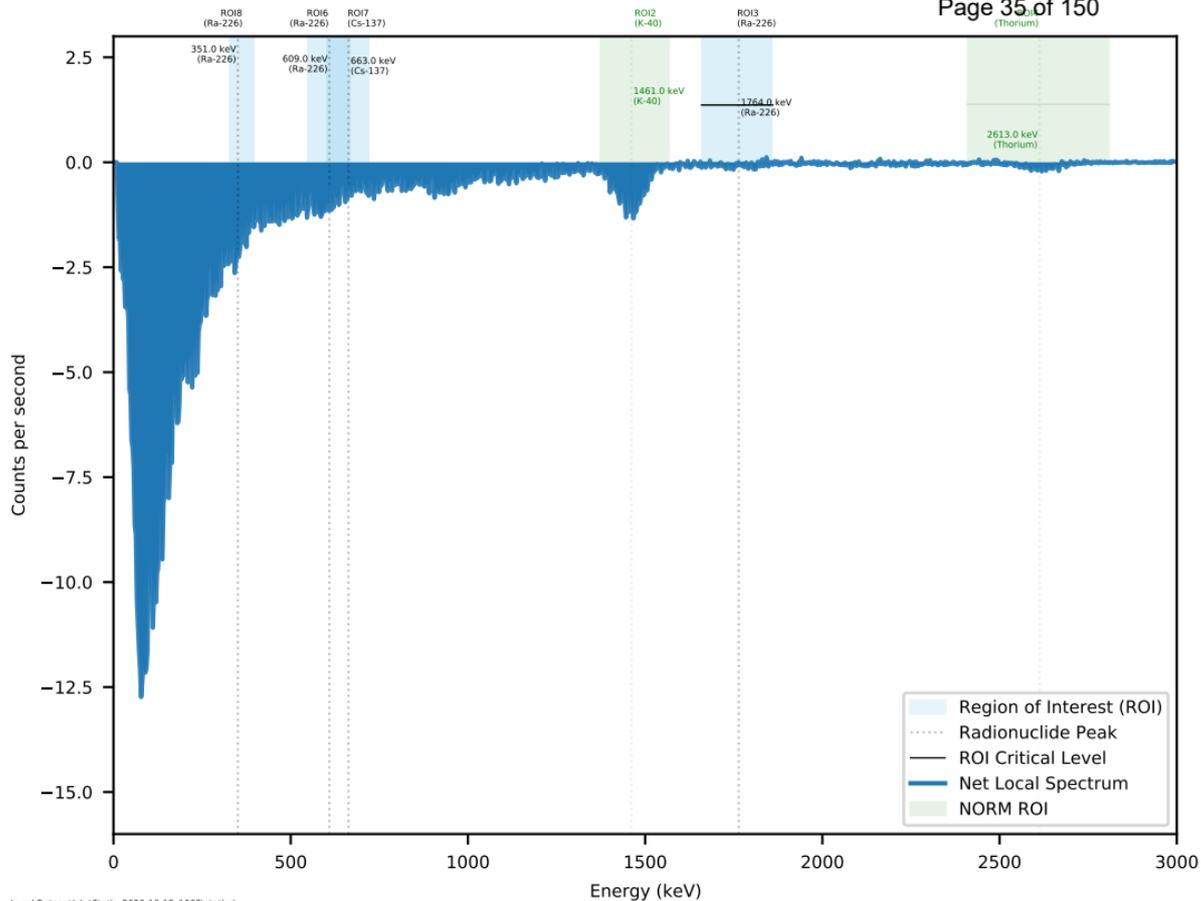


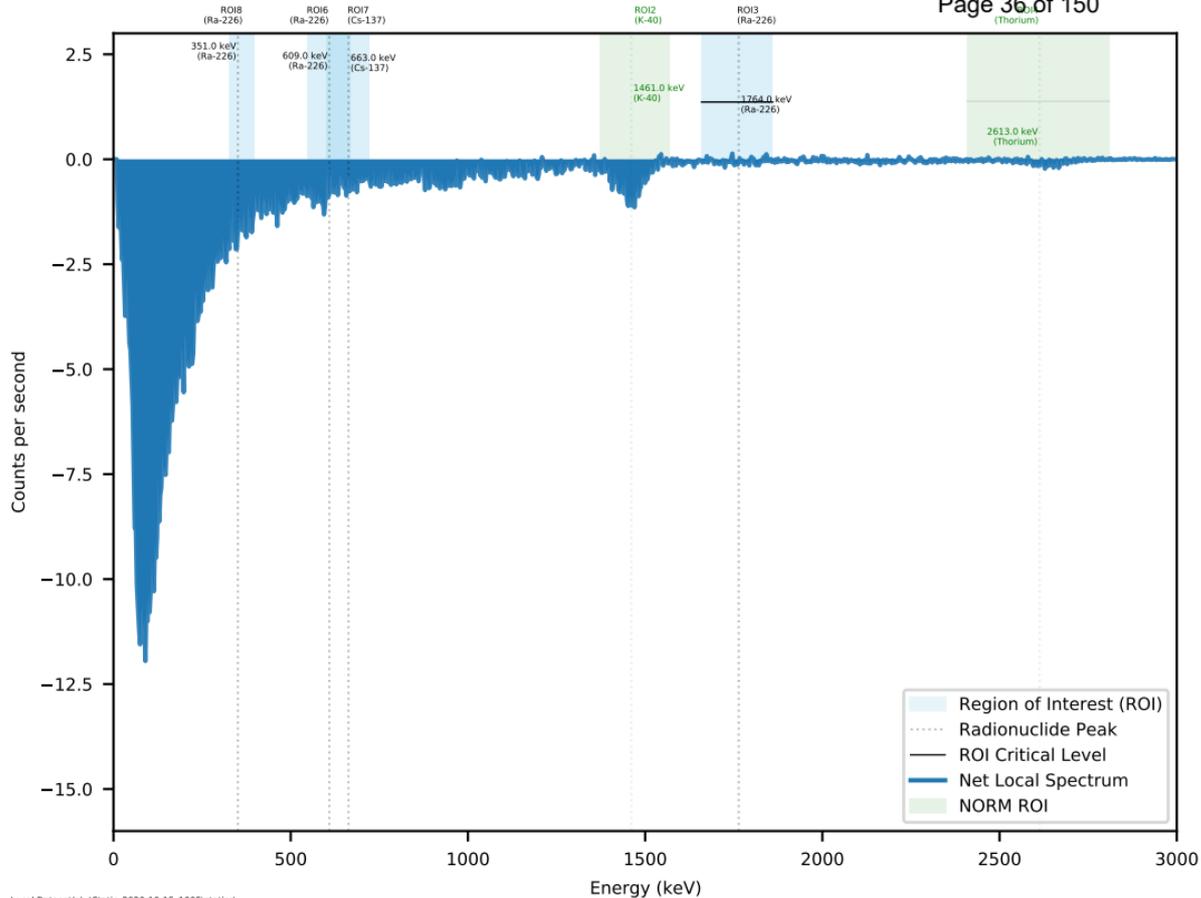


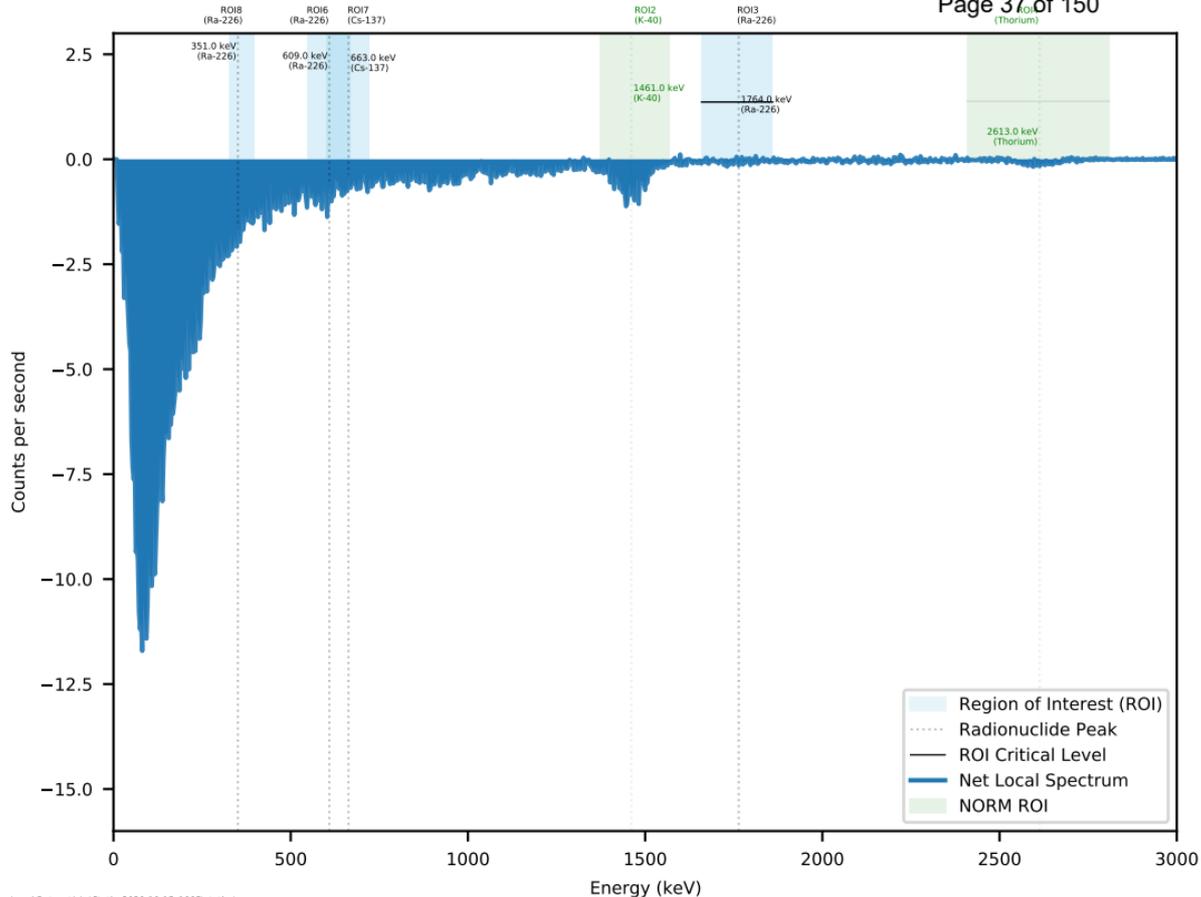


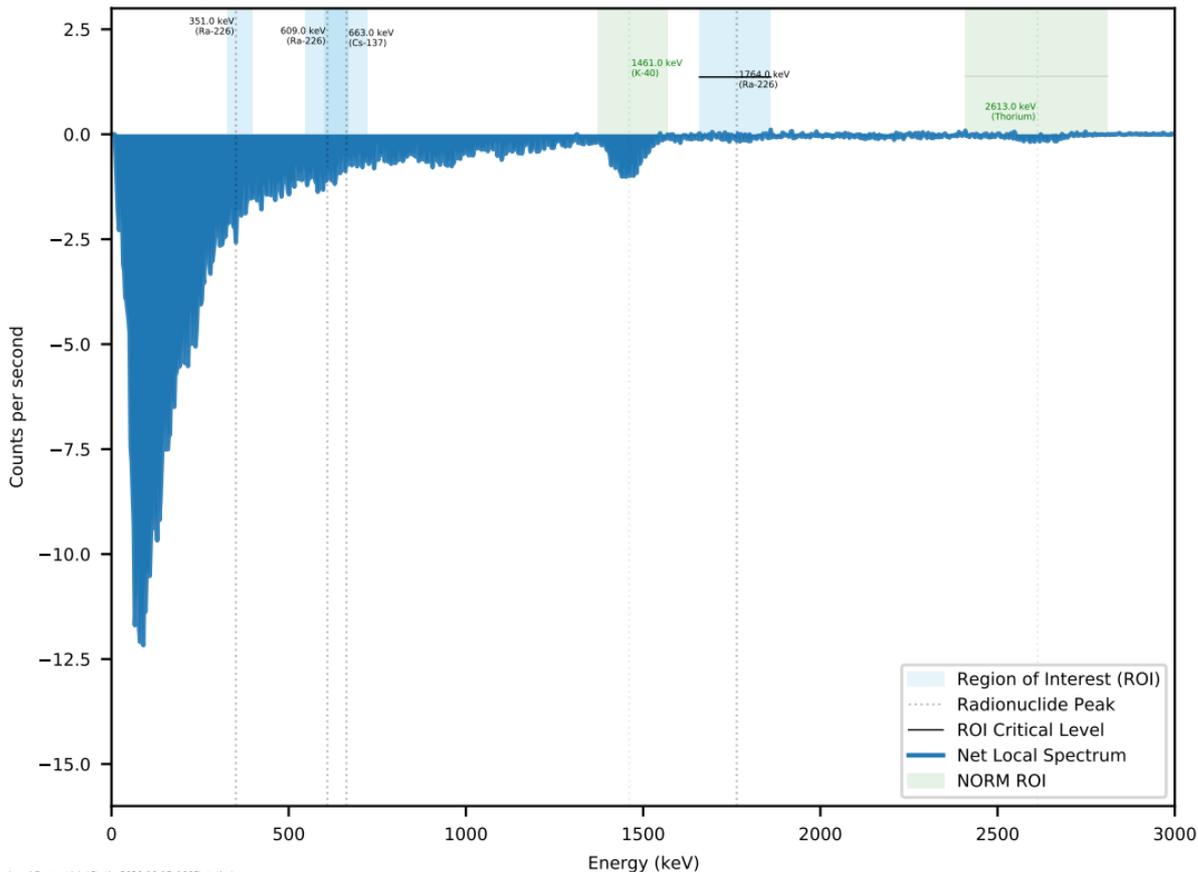


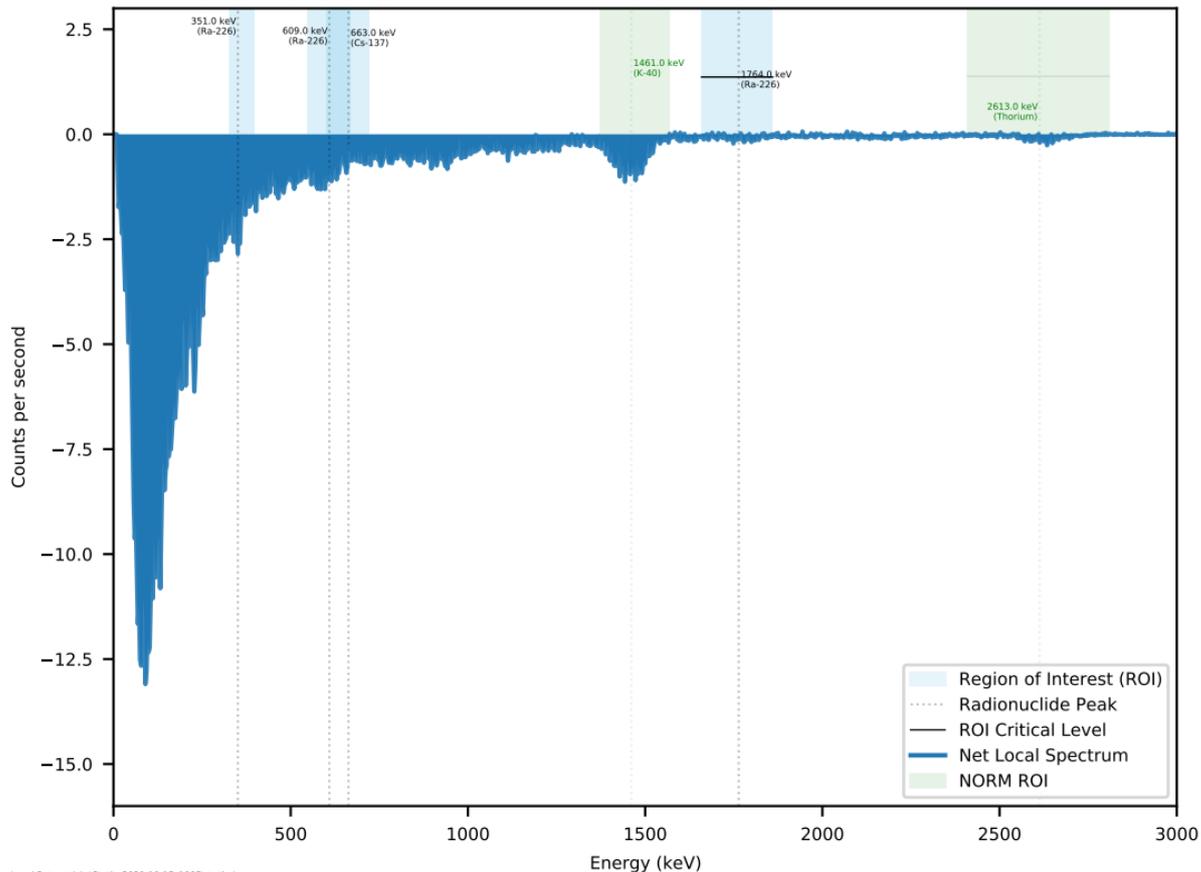


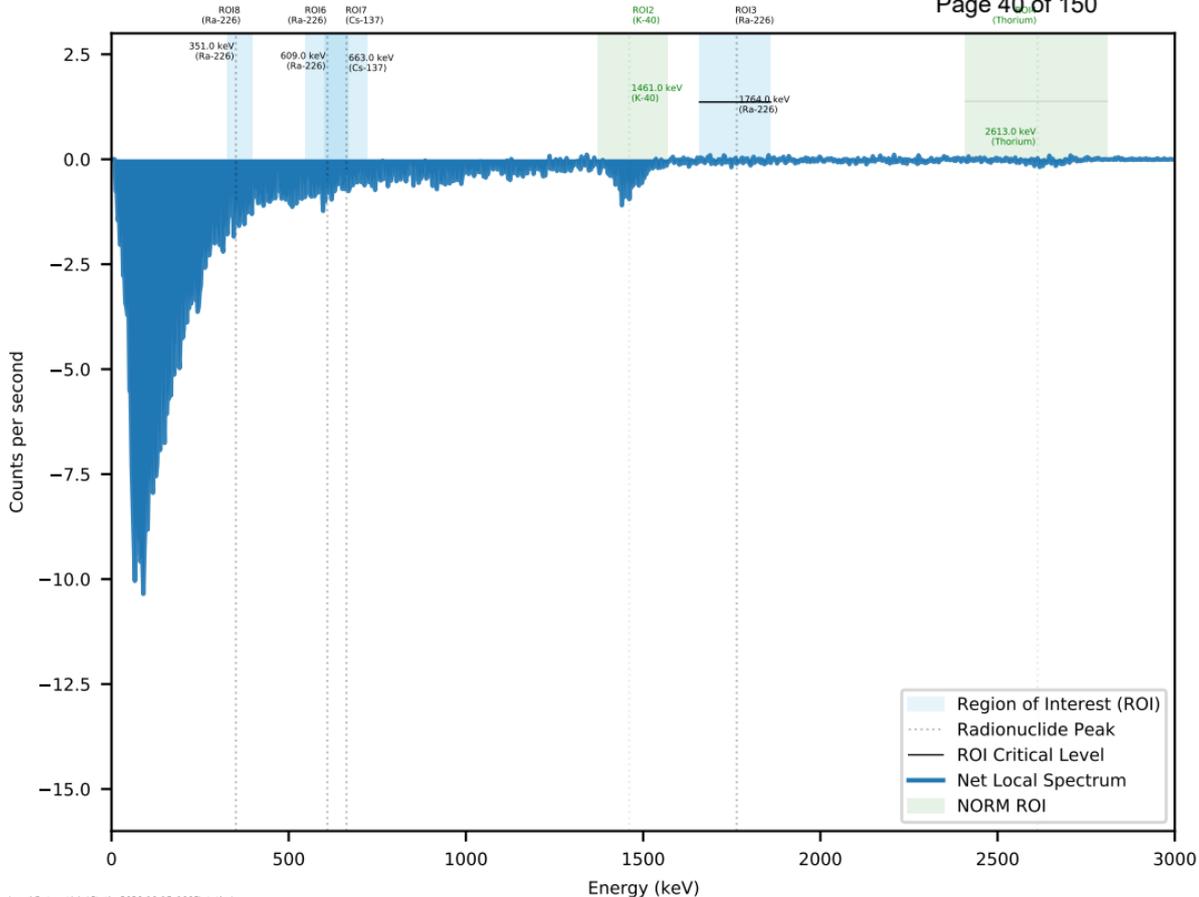


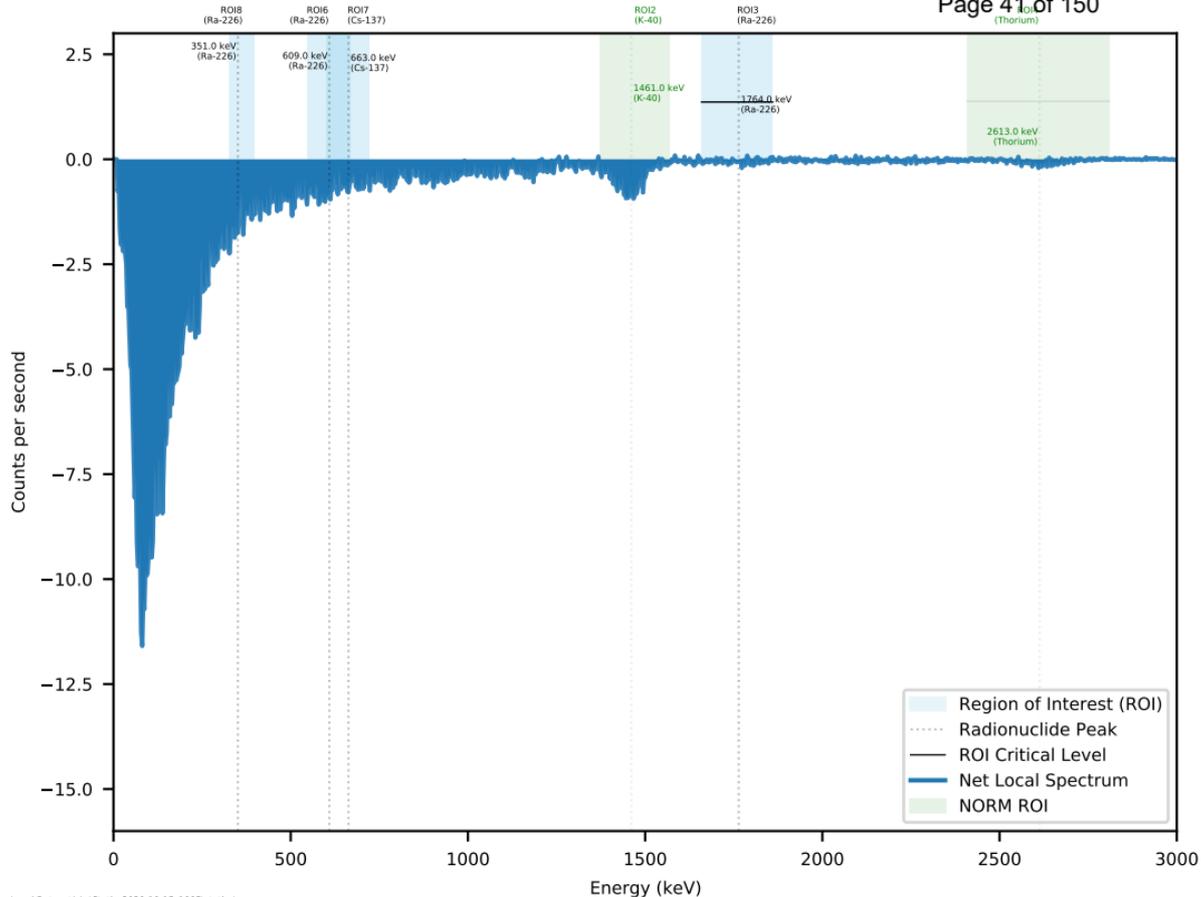


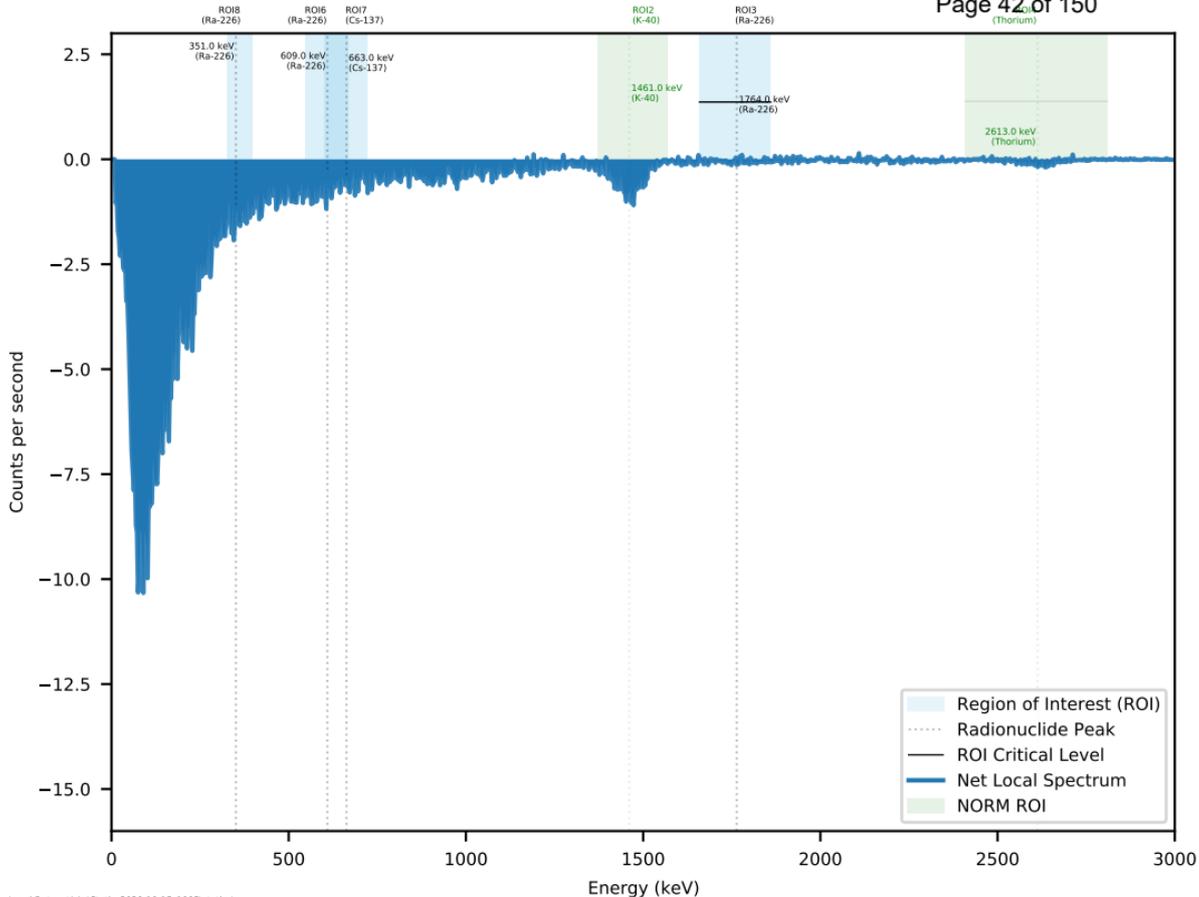


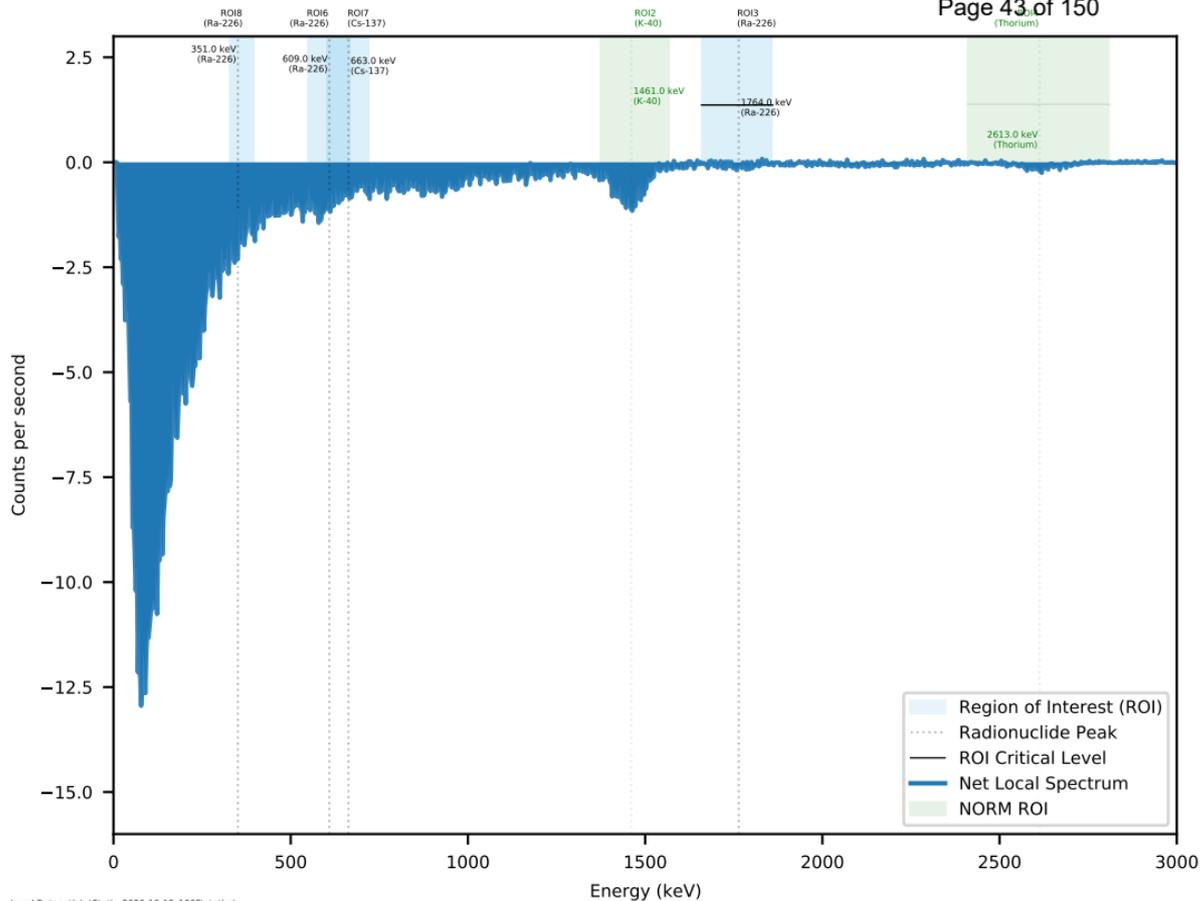


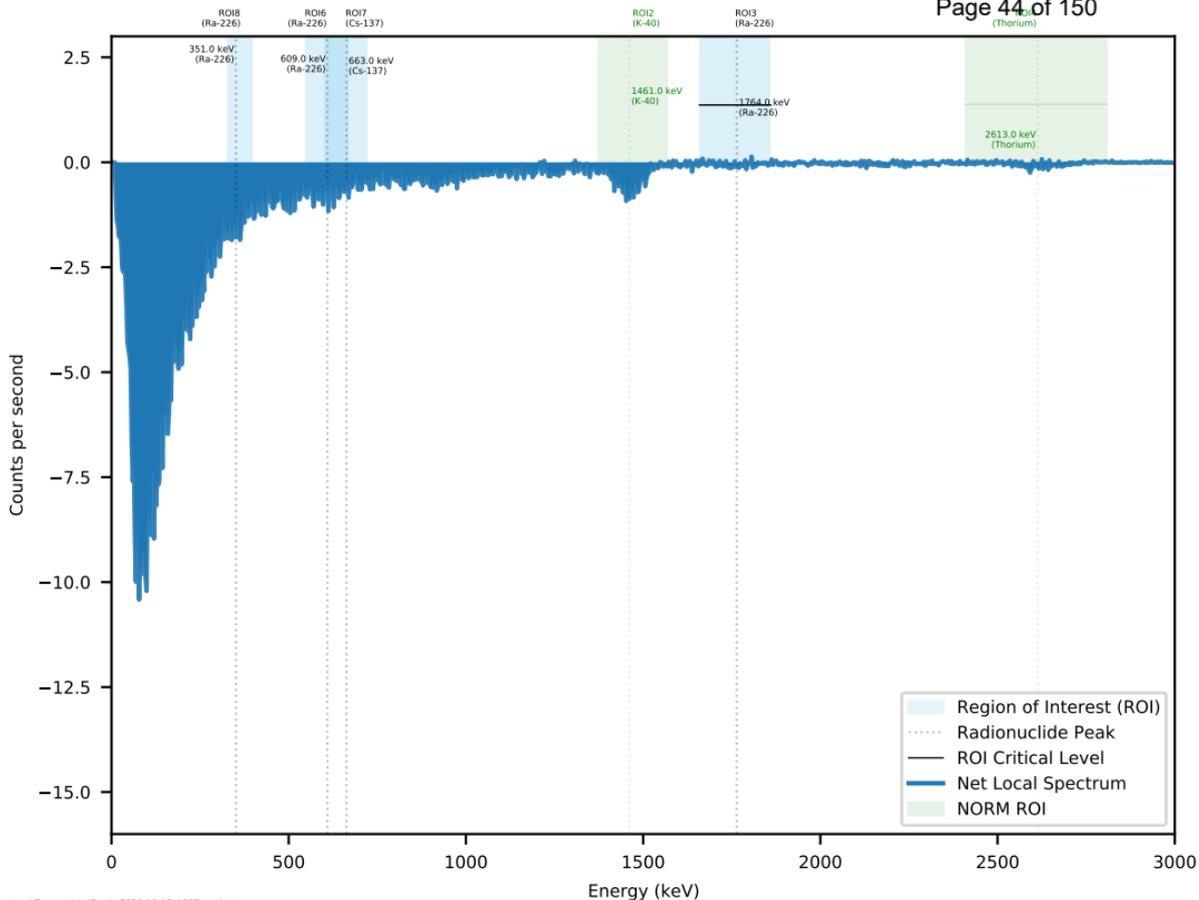


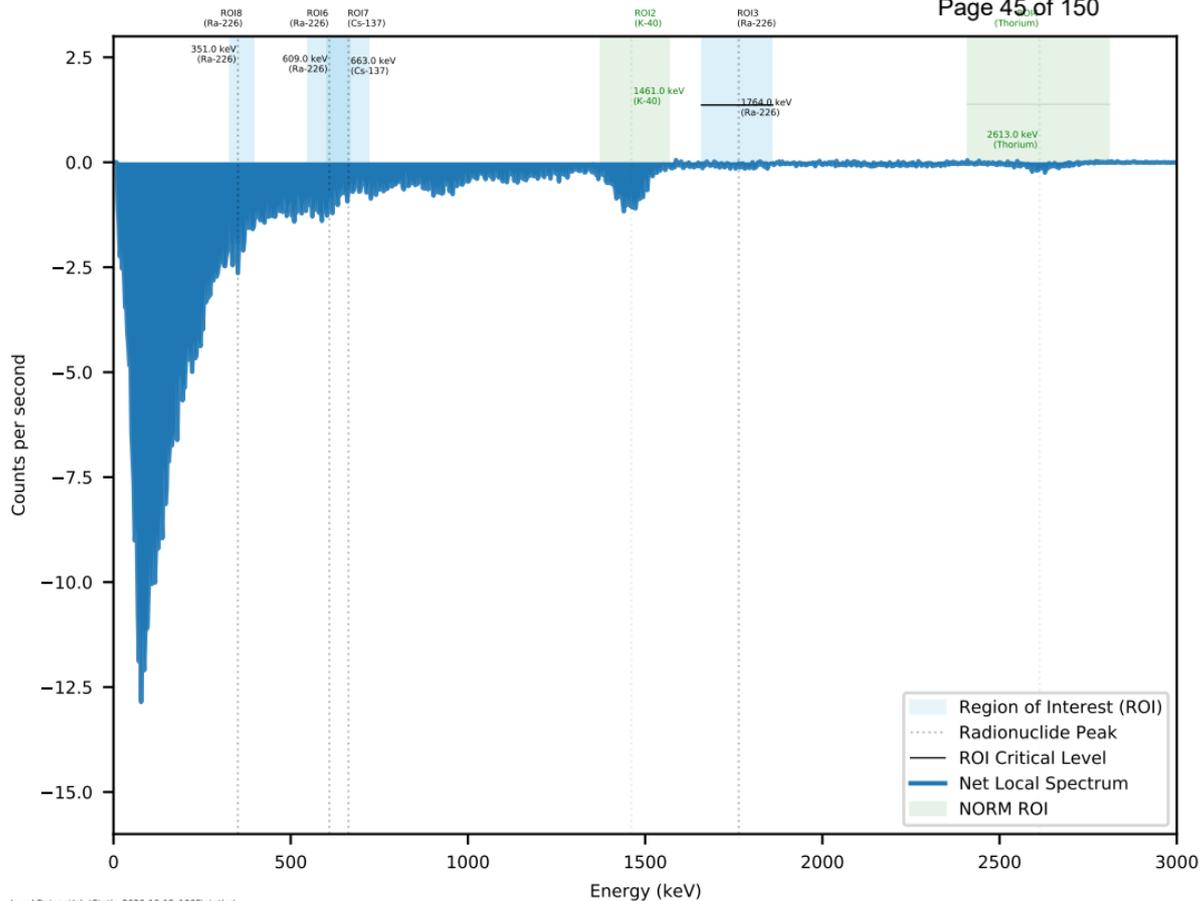


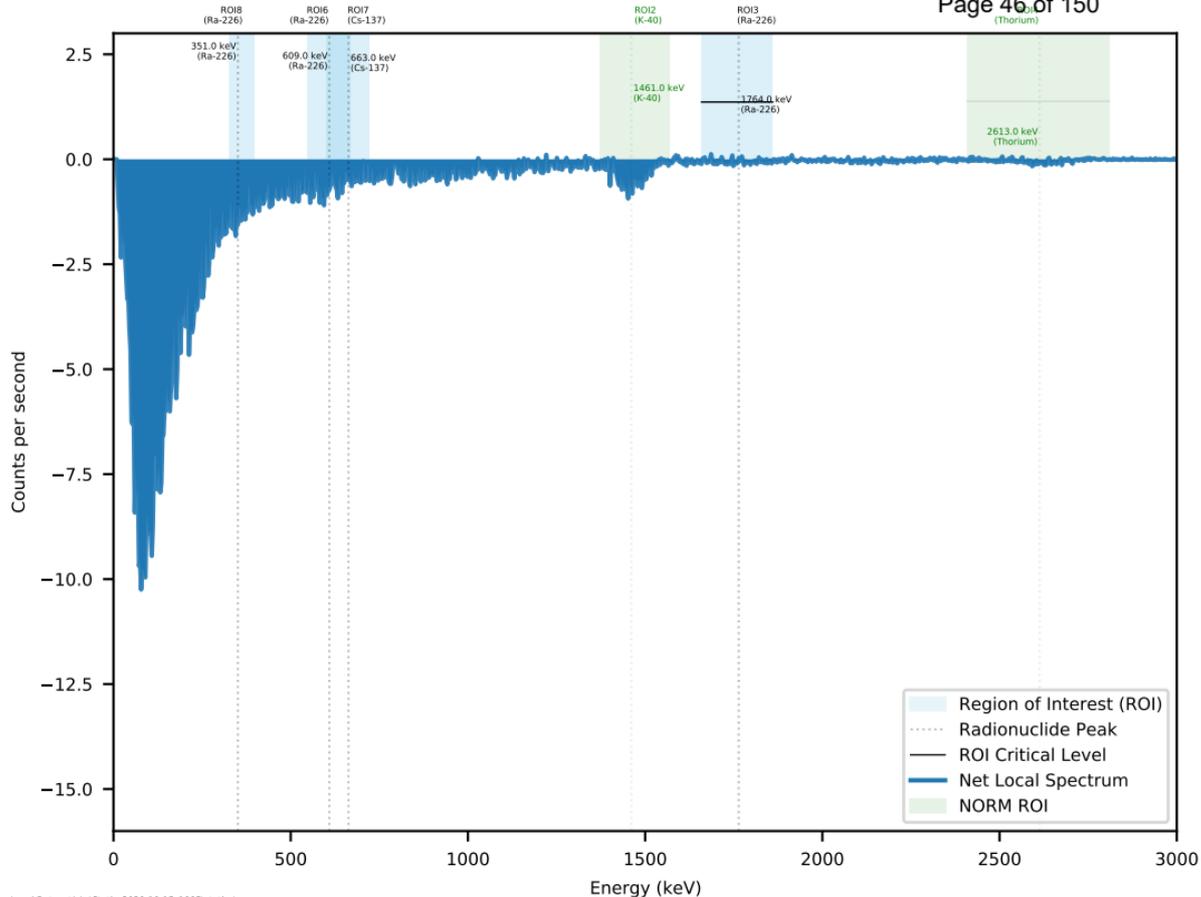


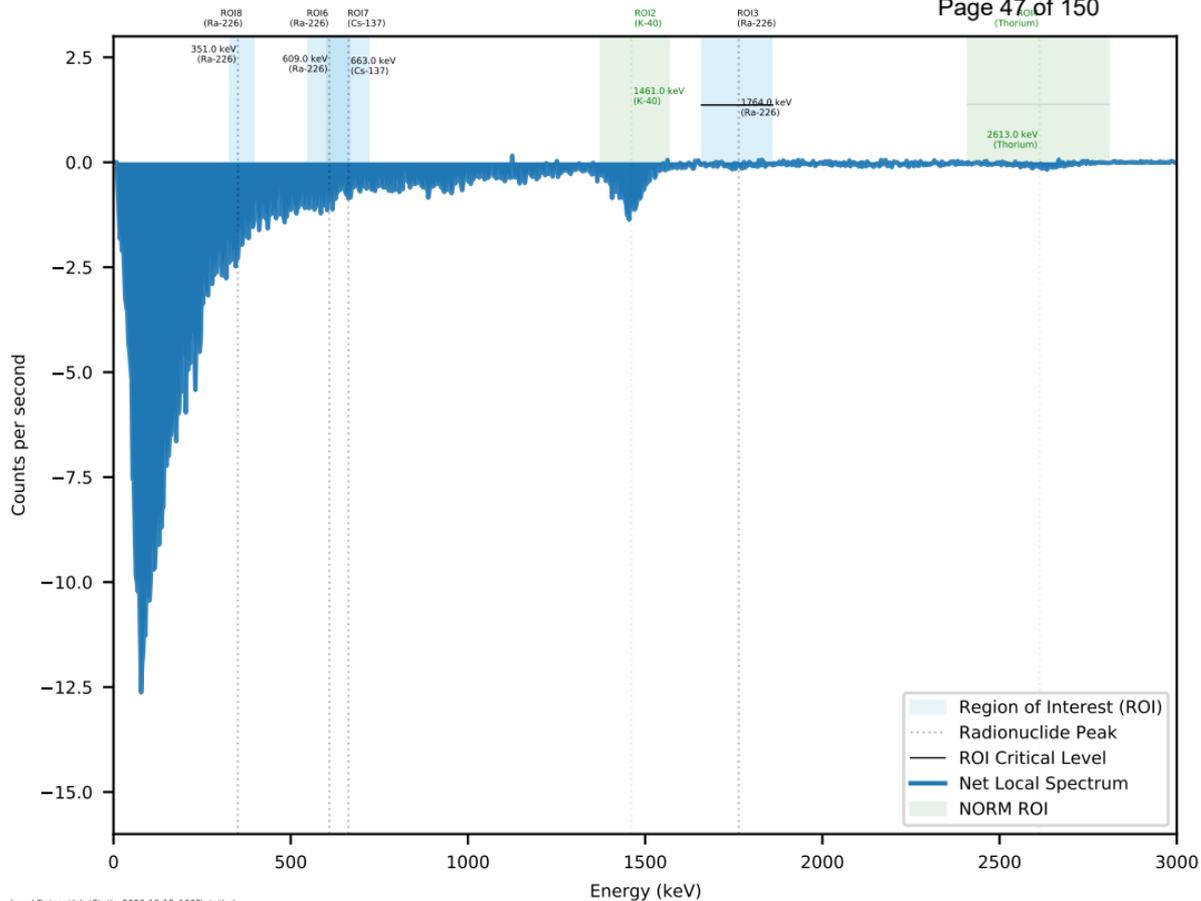


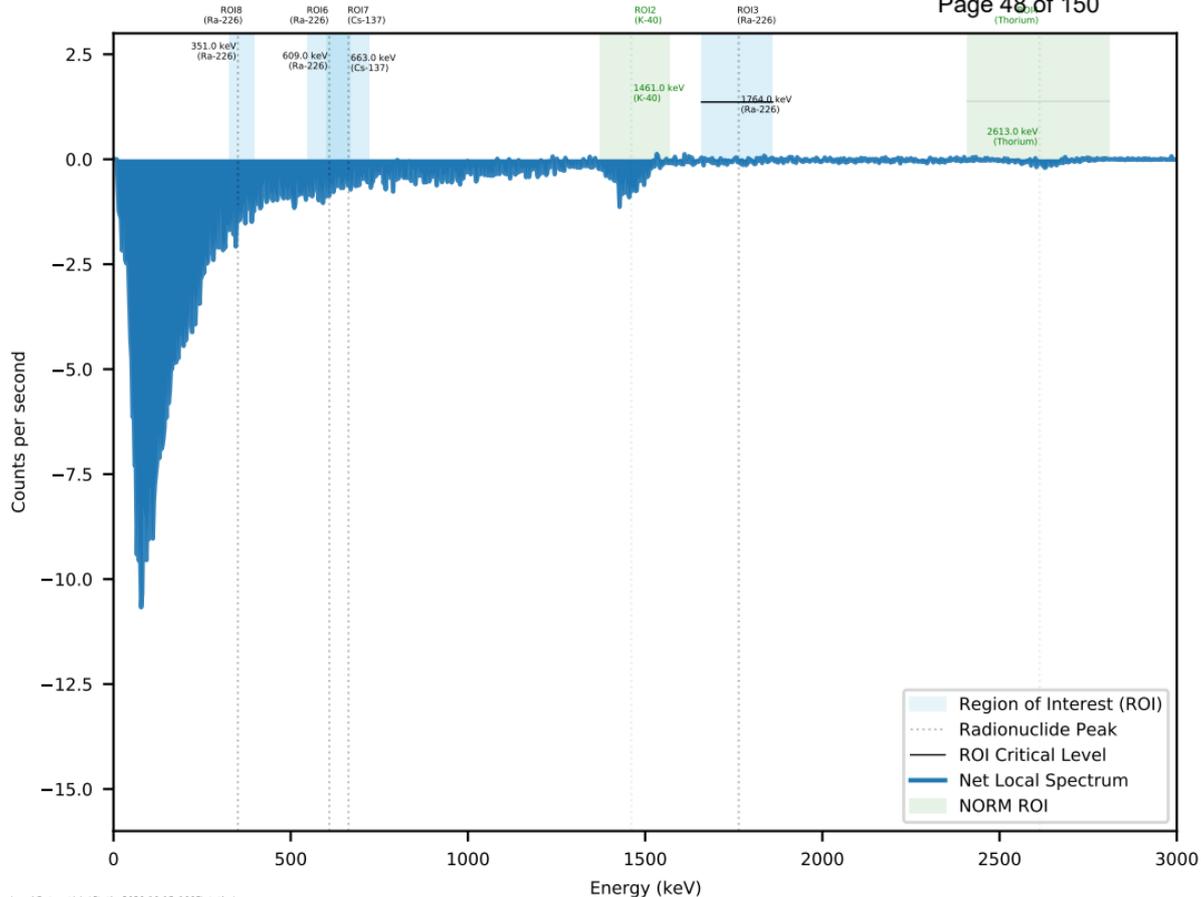


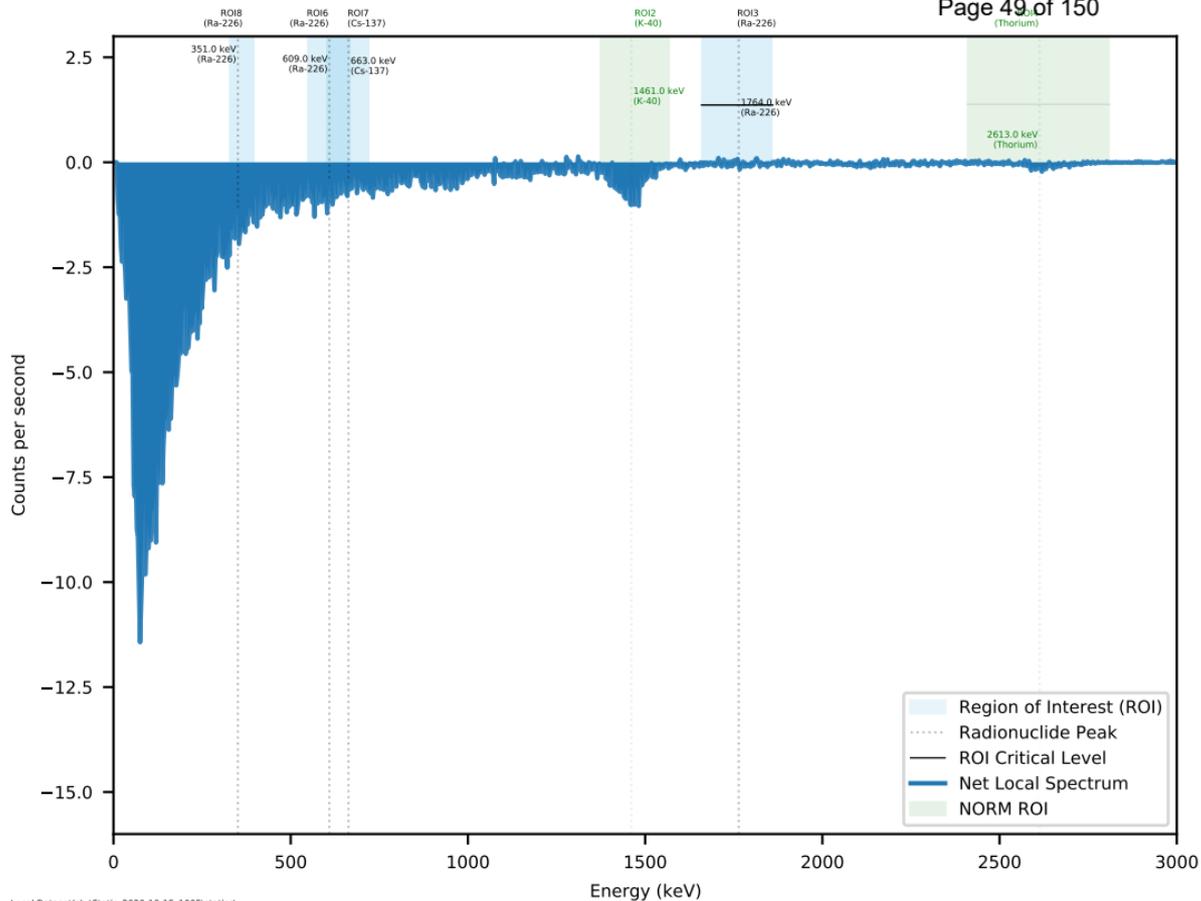


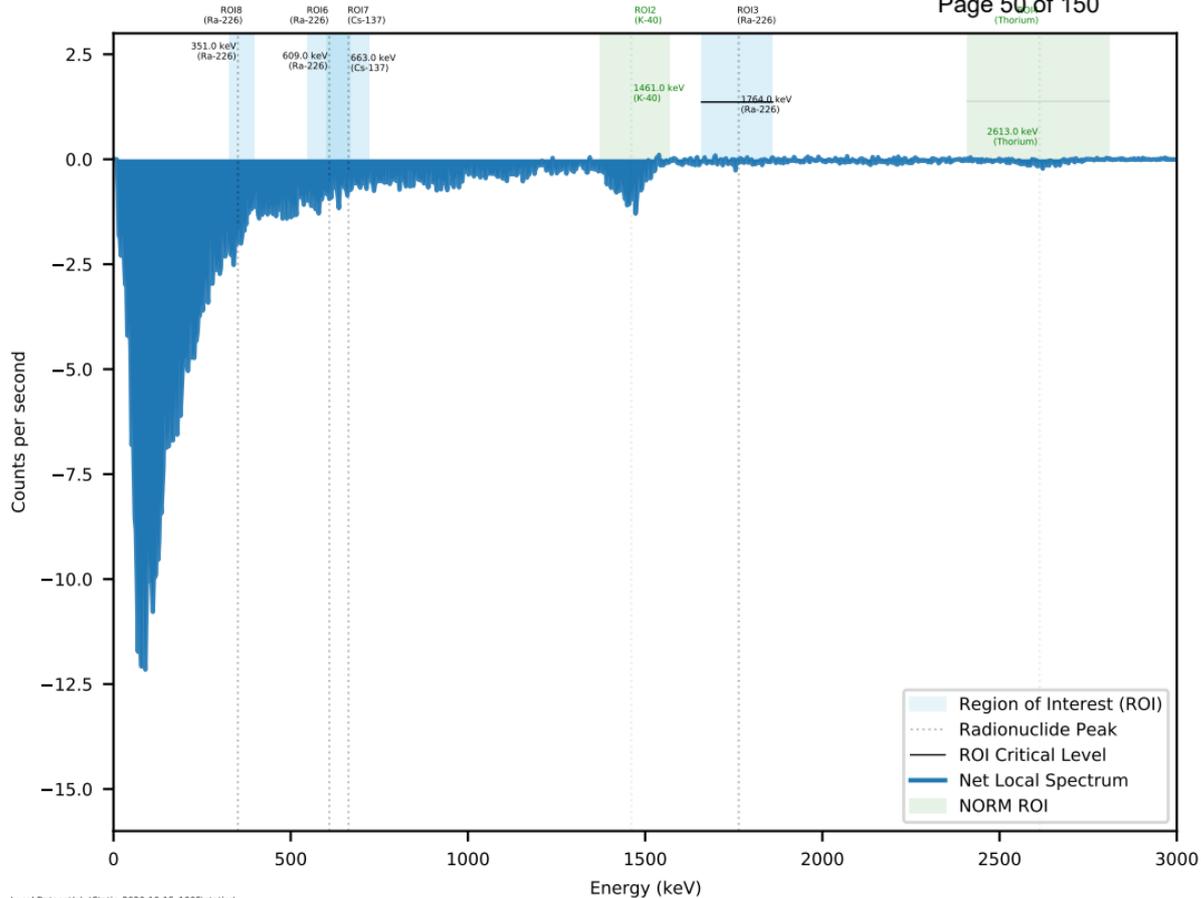


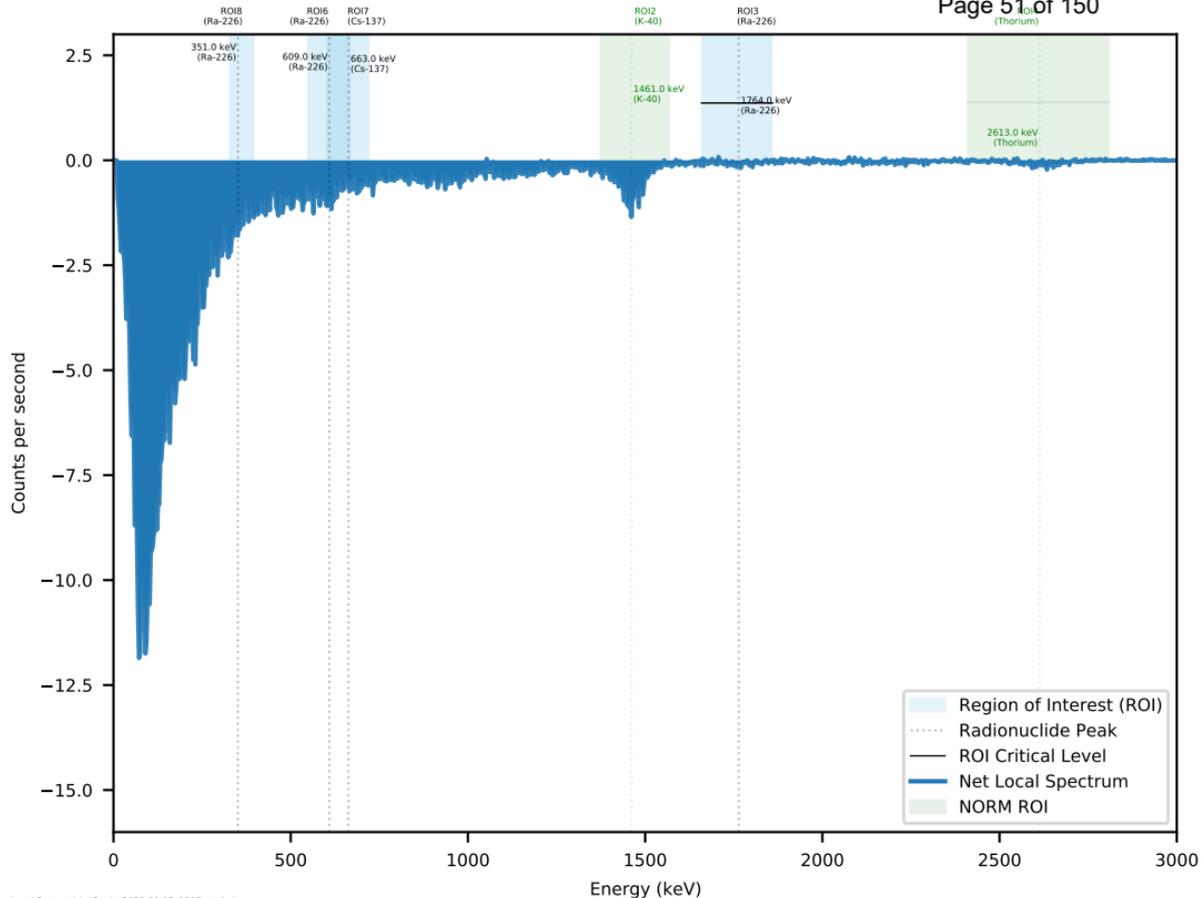


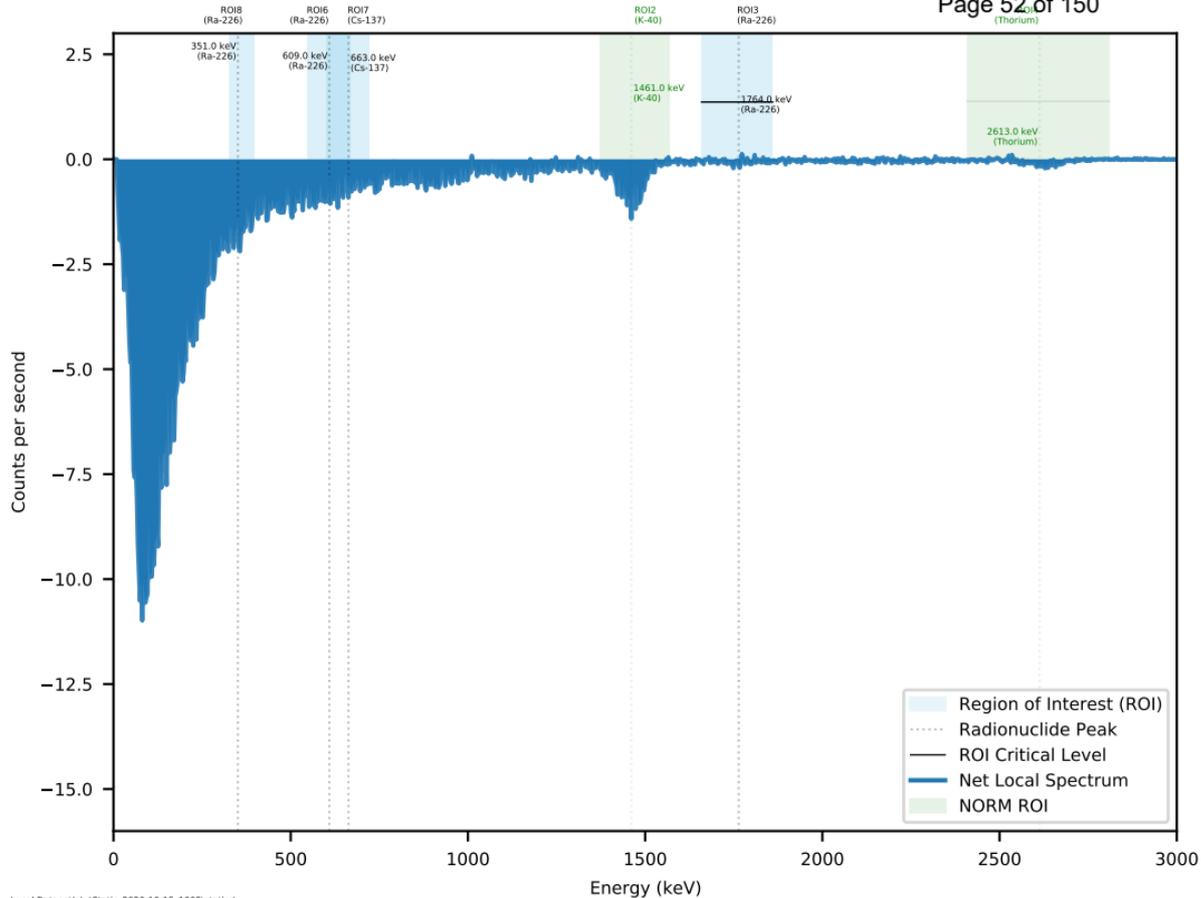


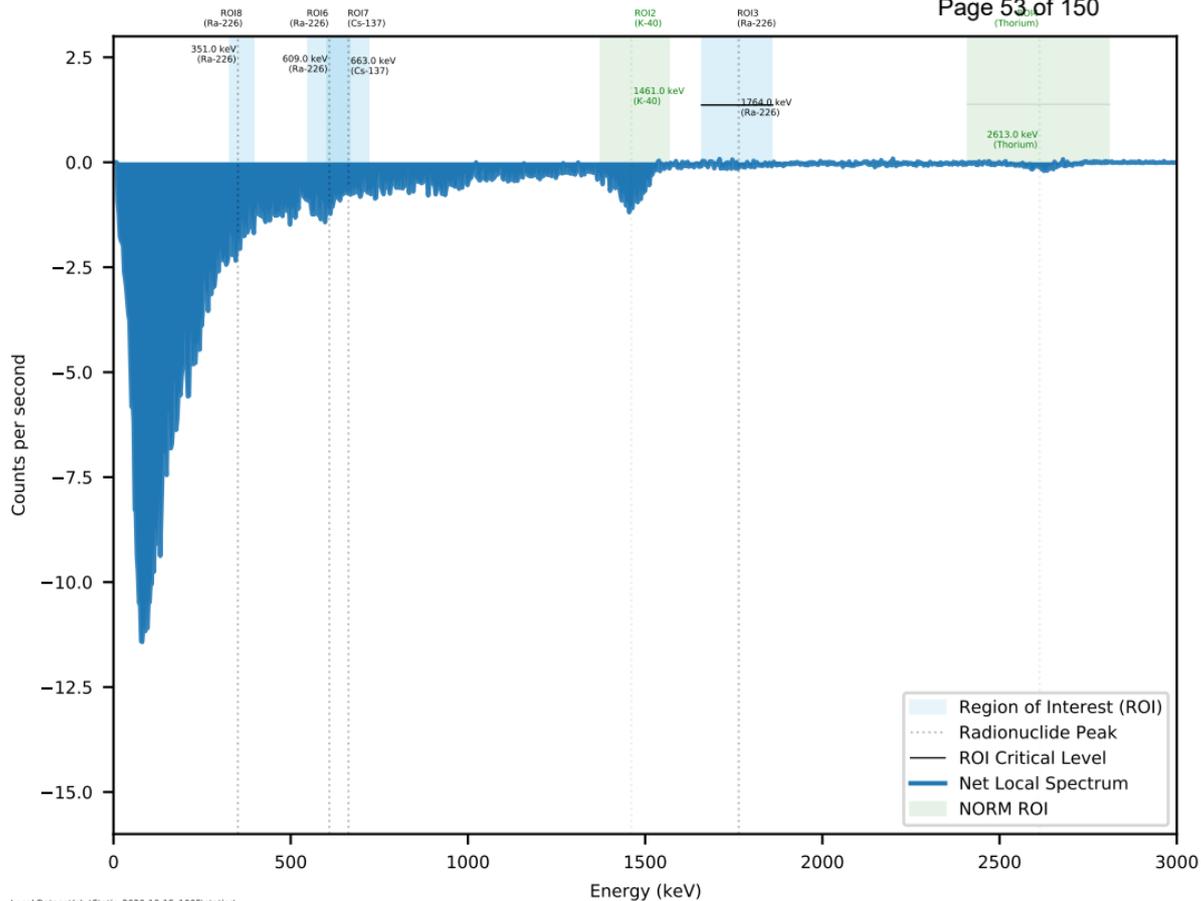


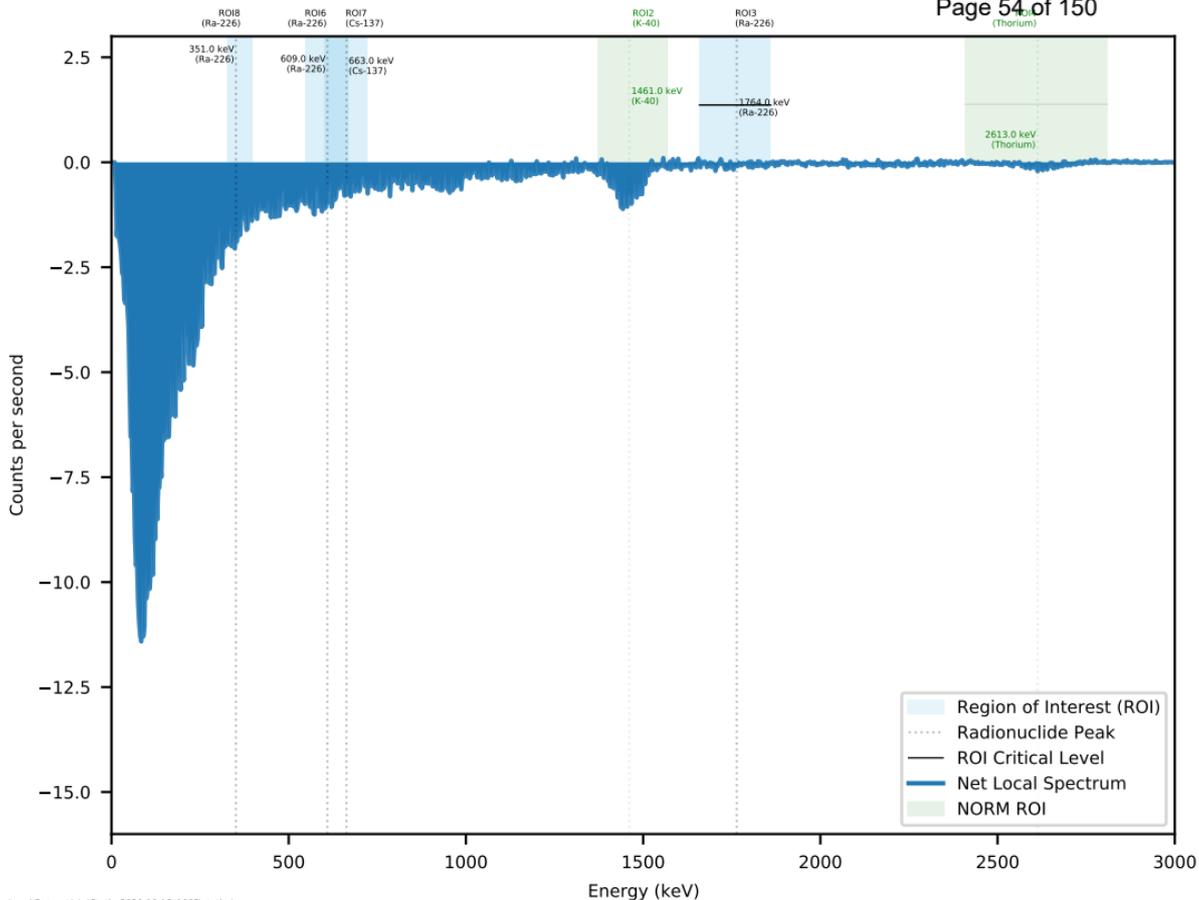


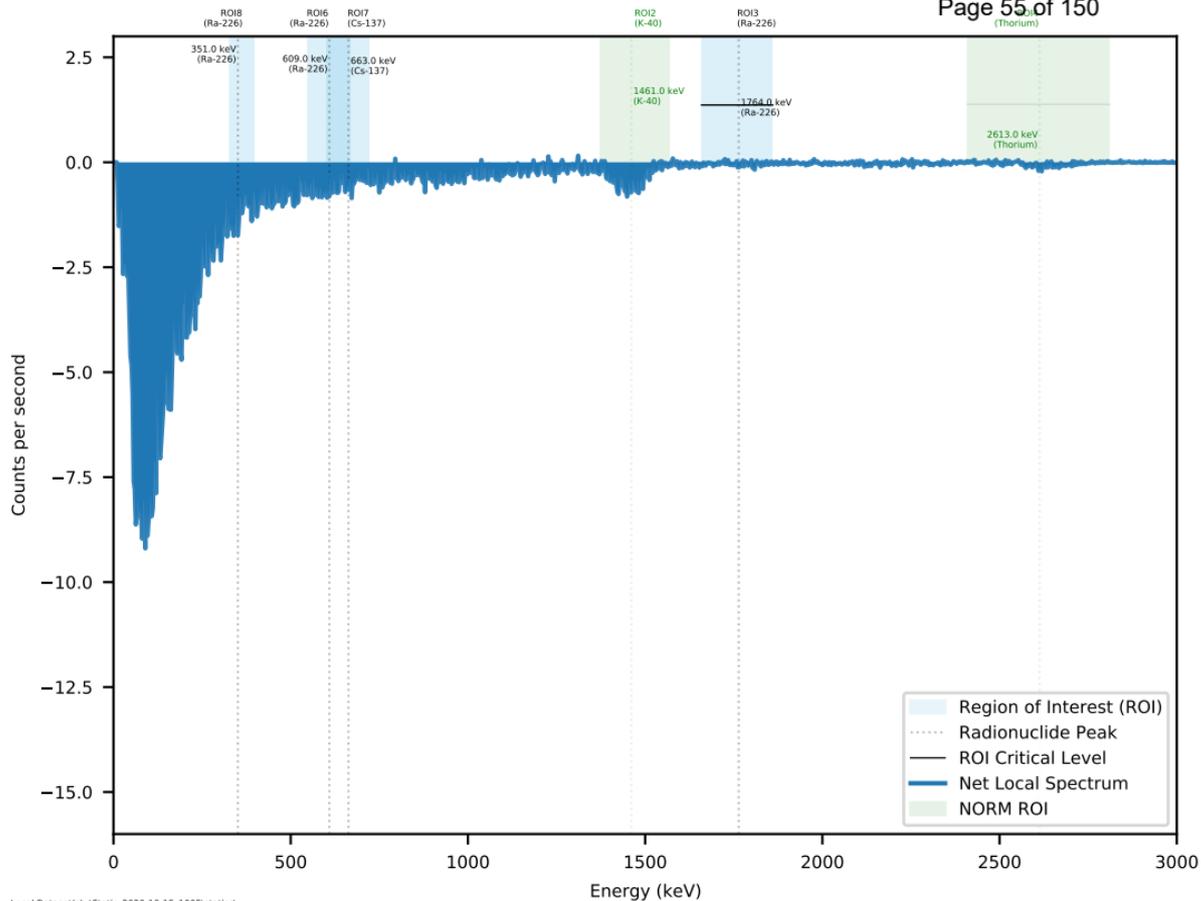


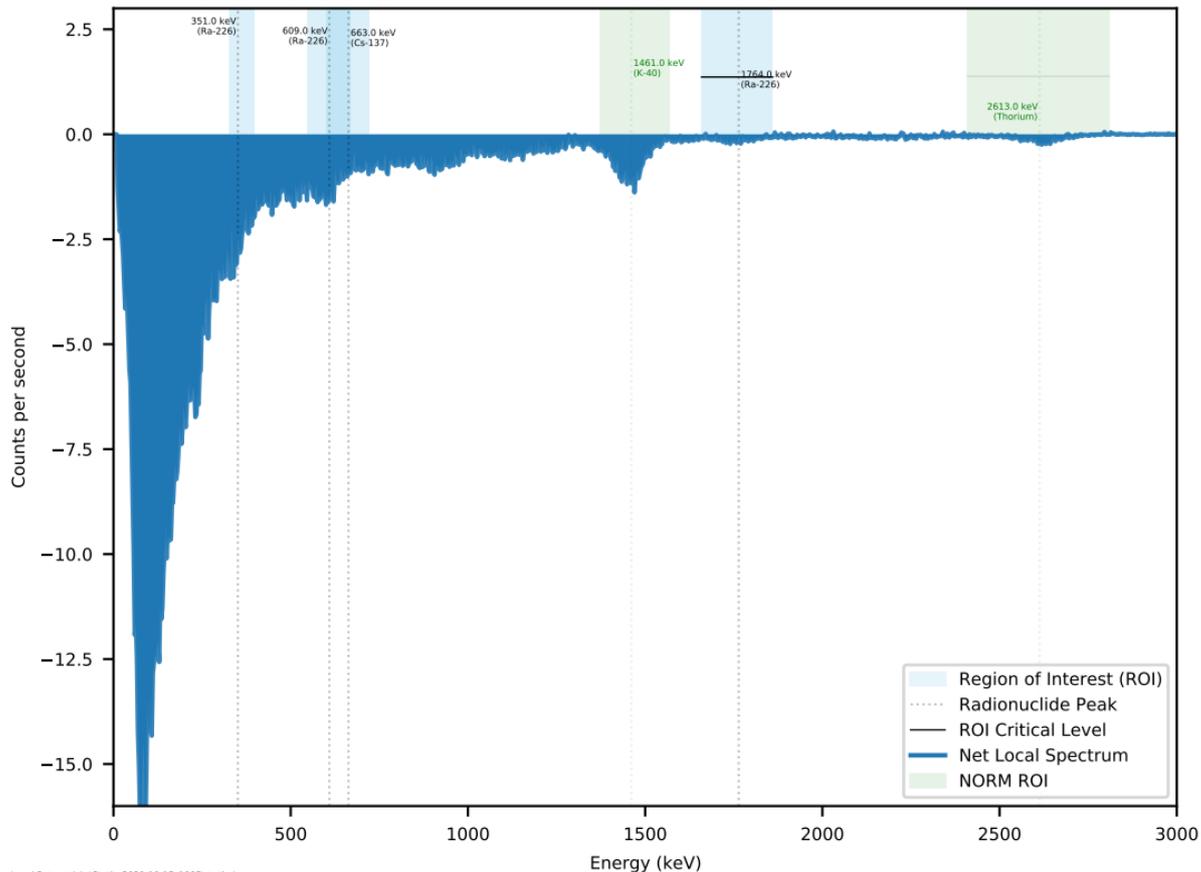


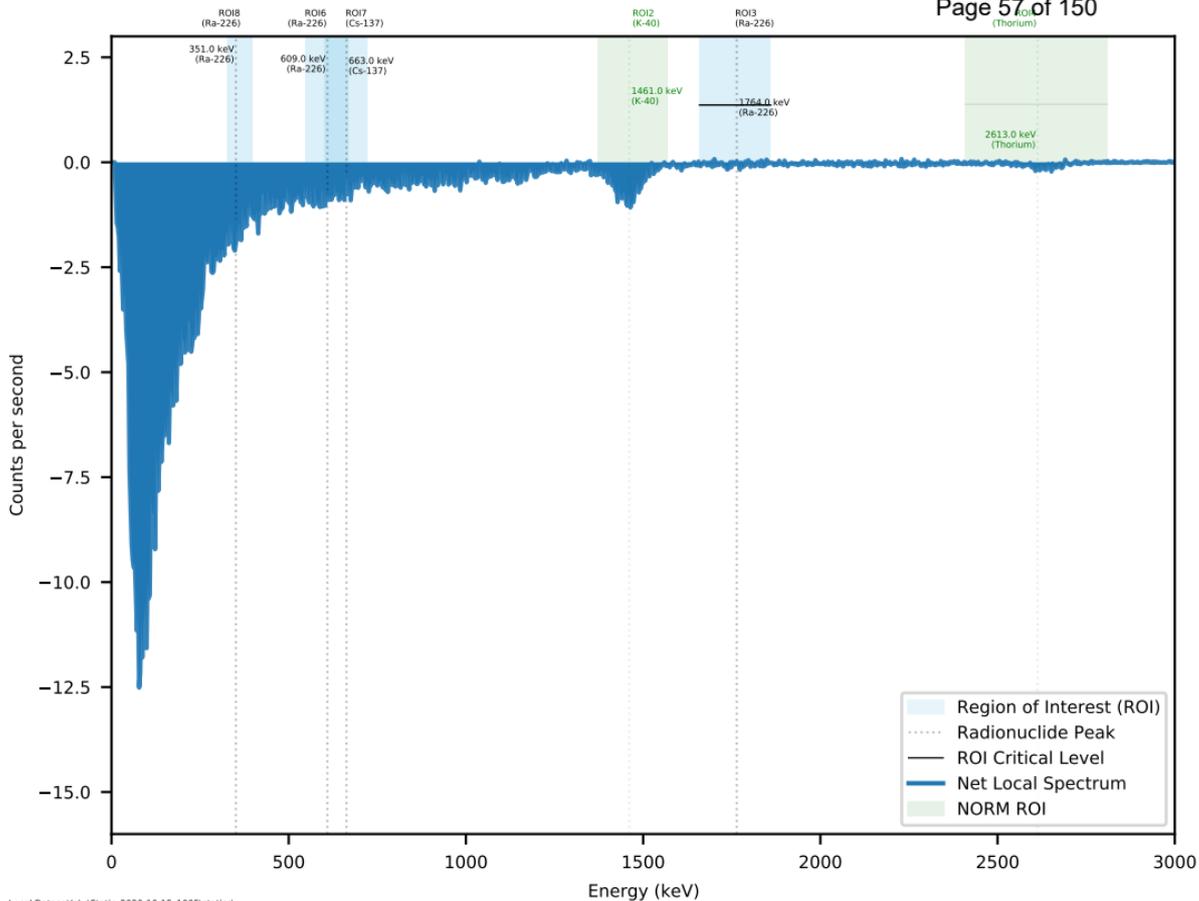


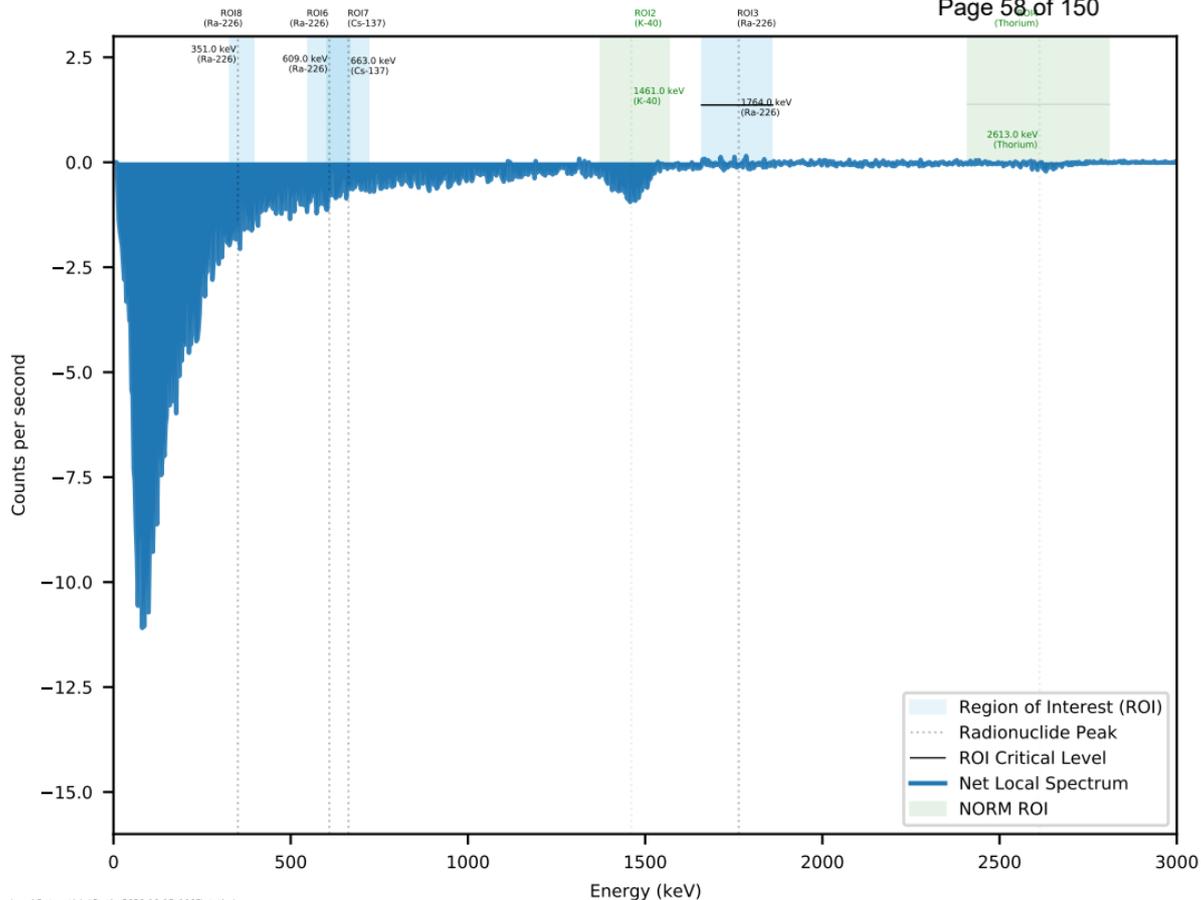


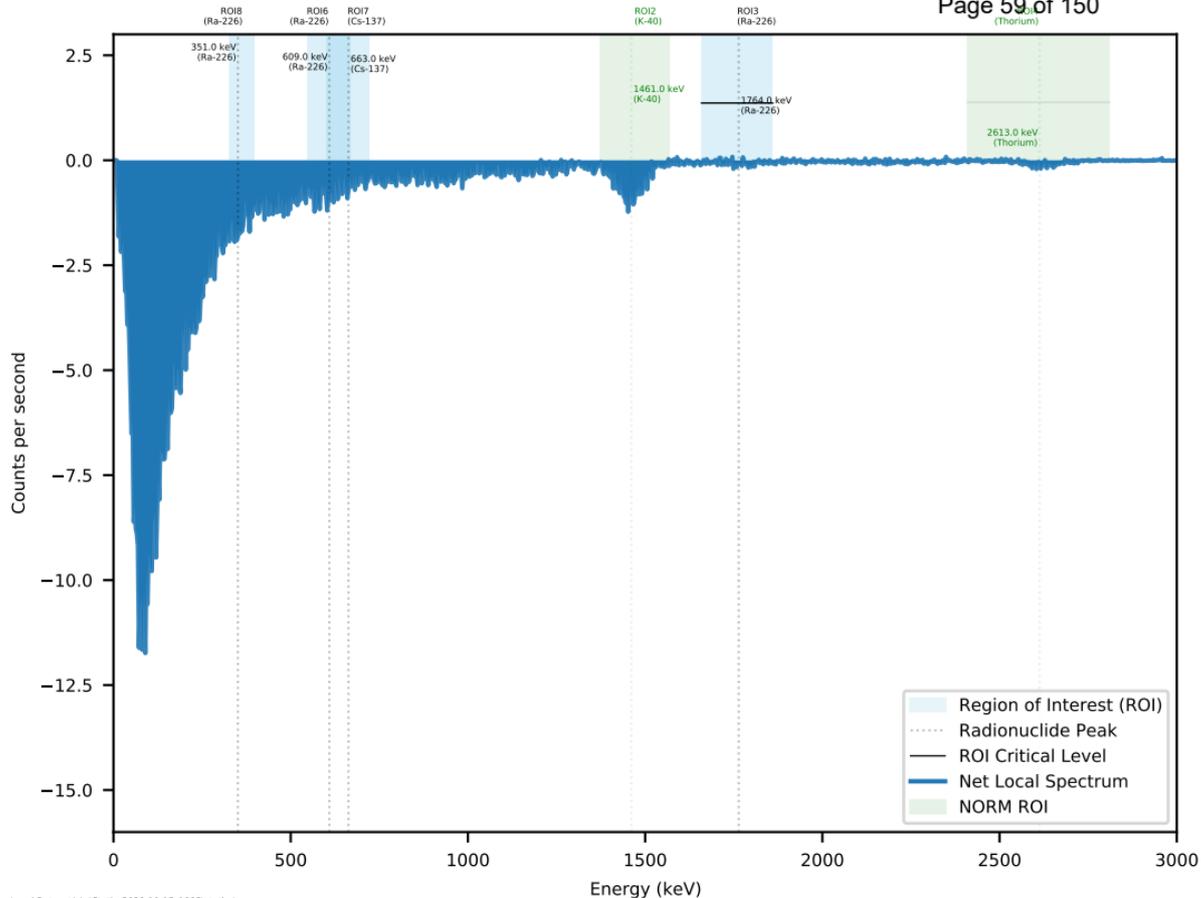


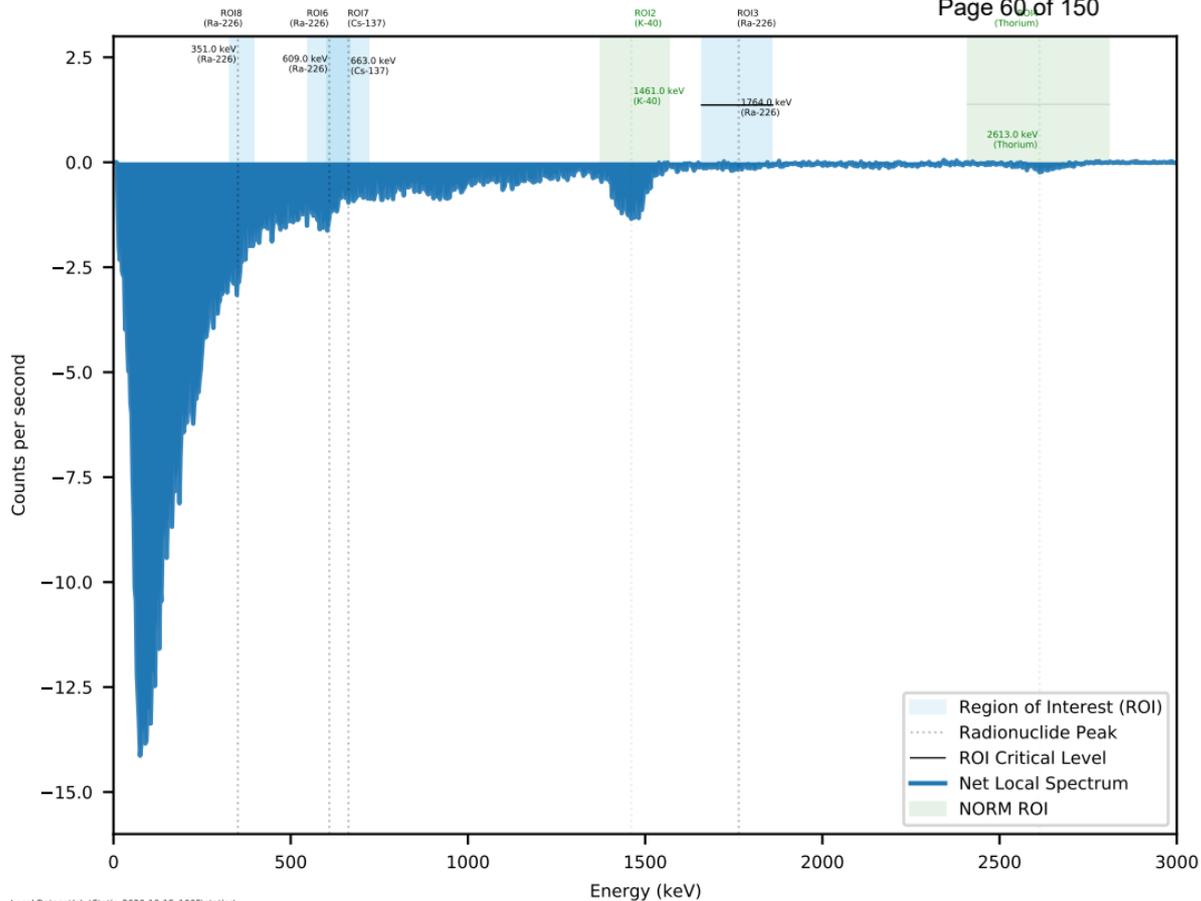


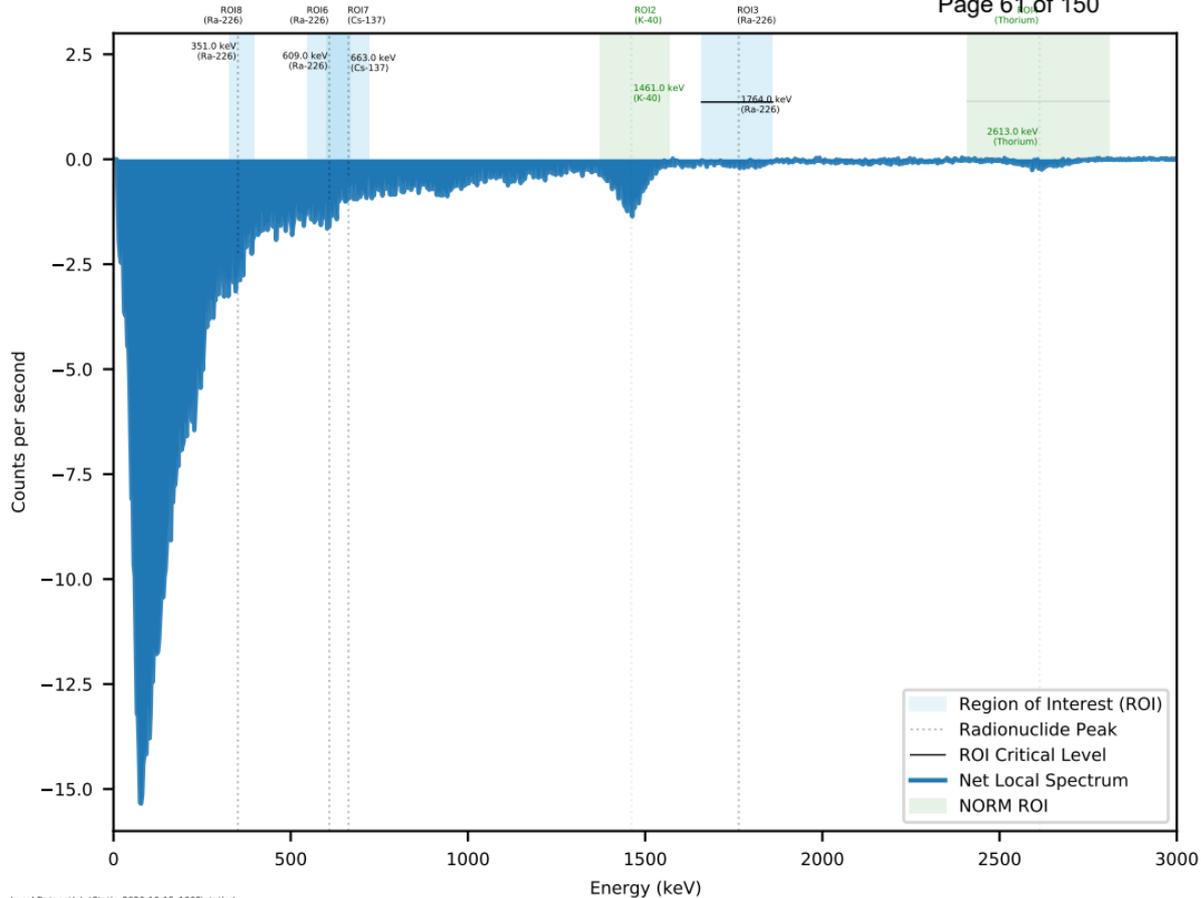


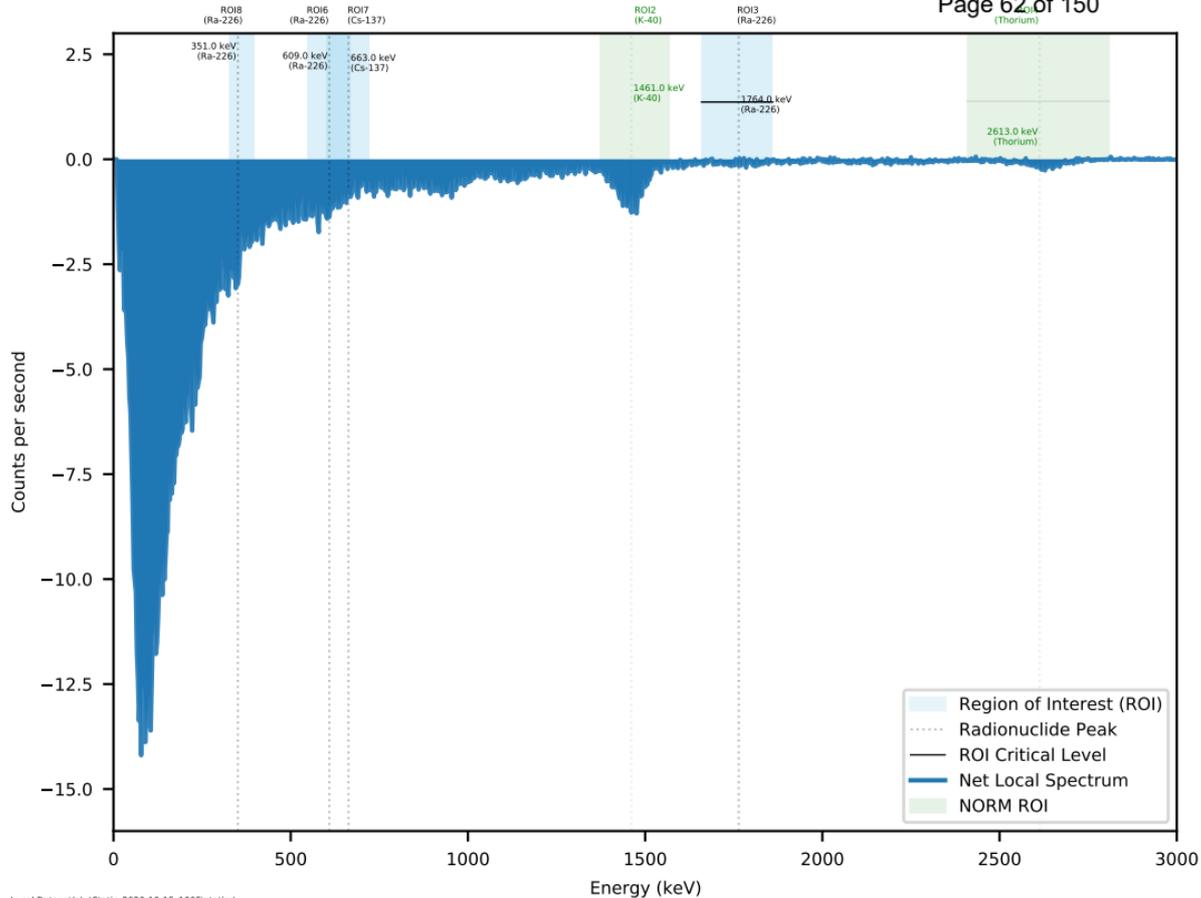


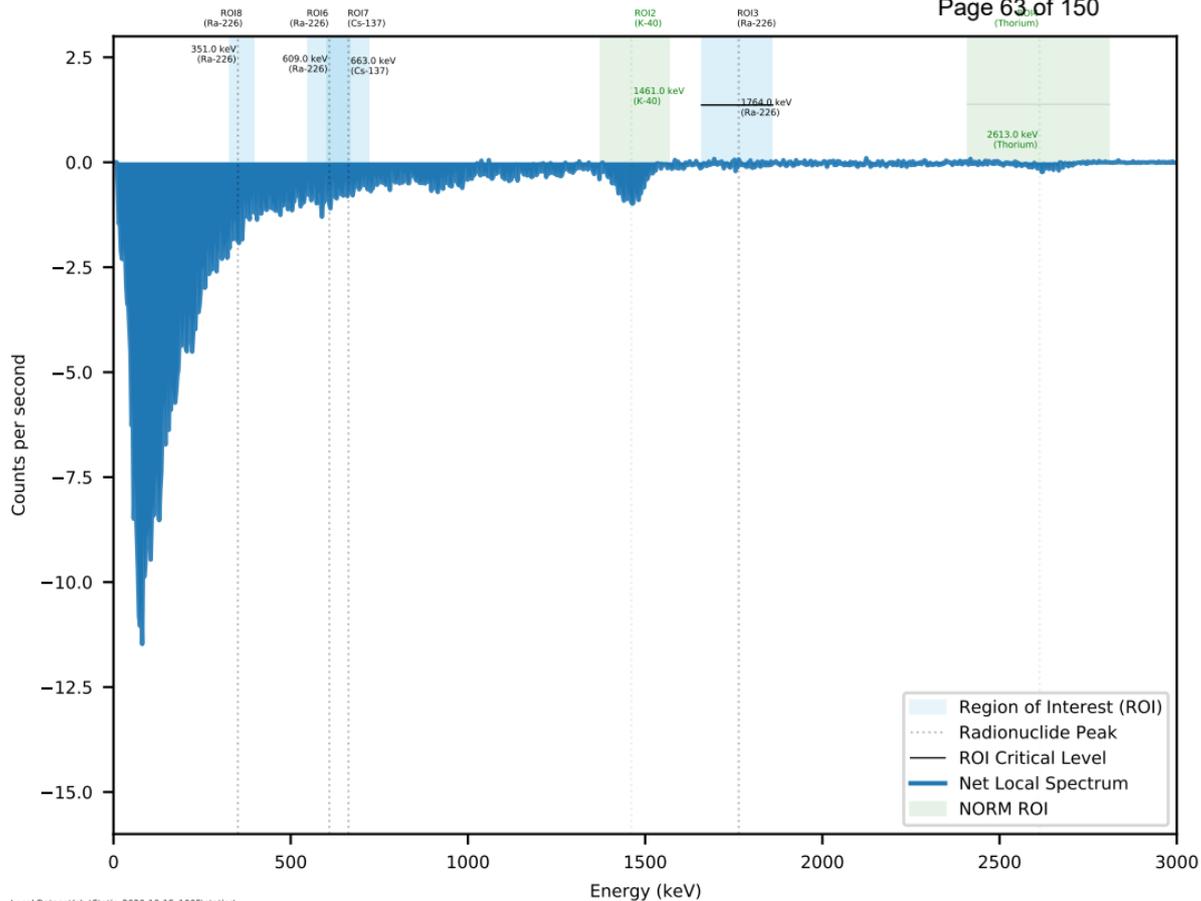


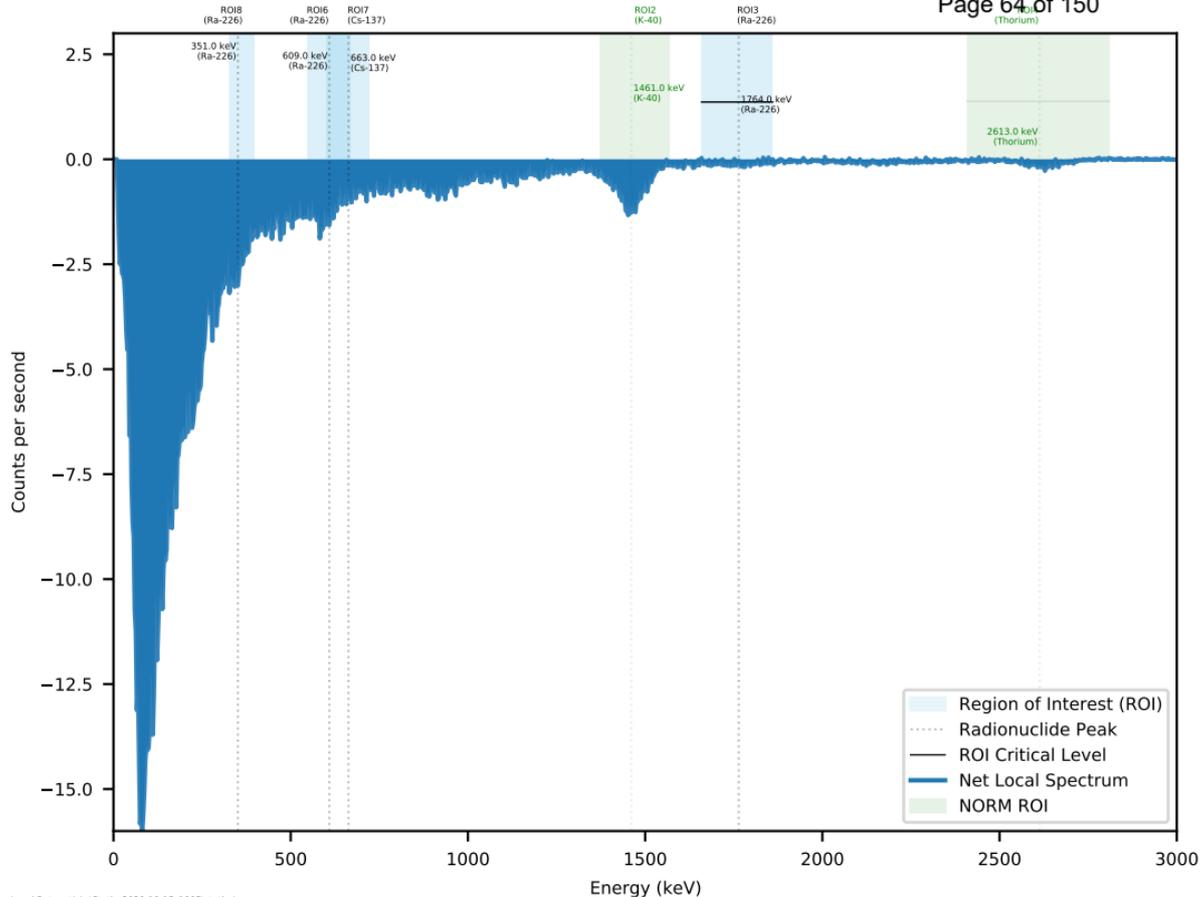


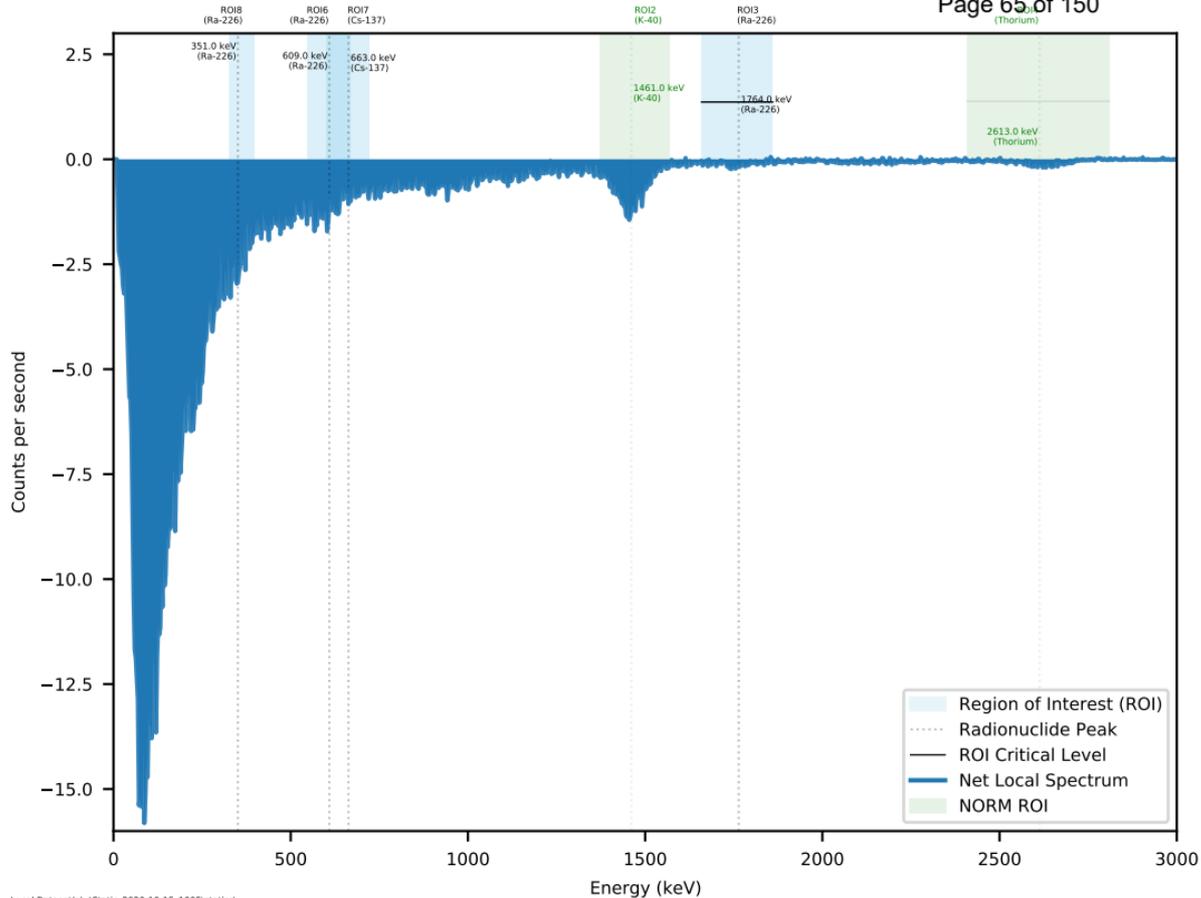


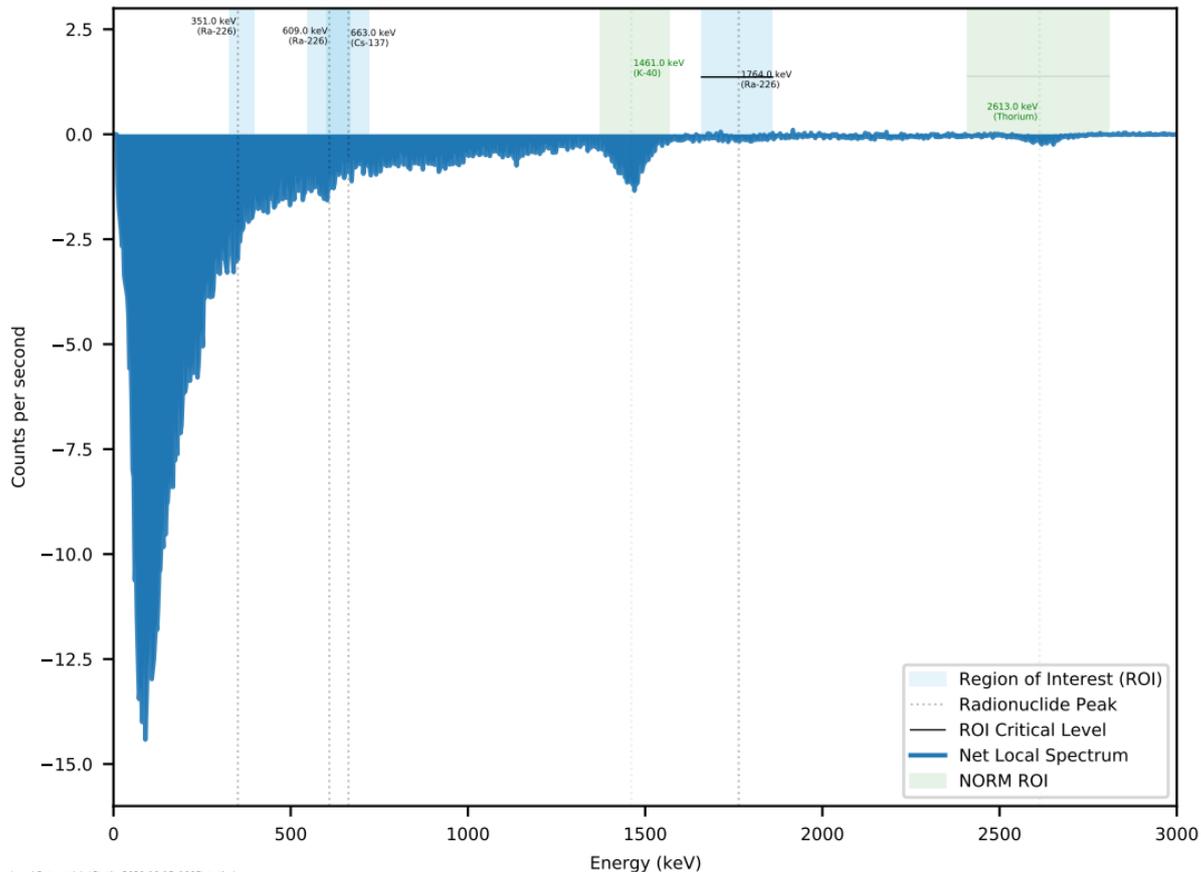


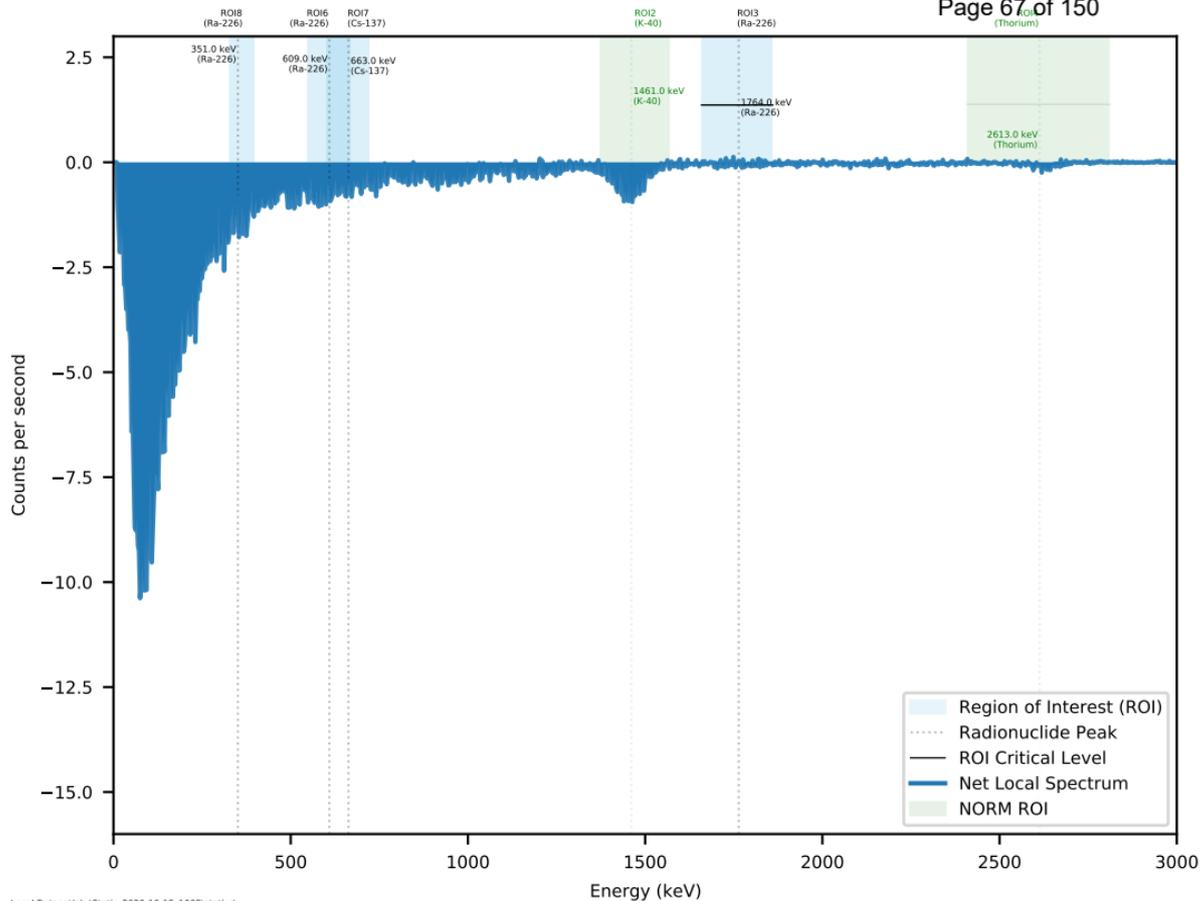














Environment Testing America

ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

Laboratory Job ID: 160-40004-1
Laboratory Sample Delivery Group: GJ46599782
Client Project/Site: HPNS-Parcel G 501197
Revision: 1

For:
Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
Concord, California 94520

Attn: Rose Condit

Rhonda Ridenhower

Authorized for release by:
4/13/2021 9:54:54 AM

Rhonda Ridenhower, Client Service Manager
(314)298-8566
Rhonda.Ridenhower@Eurofinset.com



LINKS

Review your project
results through
TotalAccess

Have a Question?



Visit us at:
www.eurofinsus.com/Env

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12



Table of Contents

Cover Page	1
Table of Contents	2
Case Narrative	3
Chain of Custody	6
Receipt Checklists	10
Definitions/Glossary	11
Method Summary	12
Sample Summary	13
Client Sample Results	14
QC Sample Results	29
QC Association Summary	32
Tracer Carrier Summary	34

Case Narrative

Page 70 of 150

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40004-1
SDG: GJ46599782

Job ID: 160-40004-1

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: HPNS-Parcel G 501197

Report Number: 160-40004-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

Revision 1- Additional information requested in case narrative for total strontium

Case Narrative

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40004-1
SDG: GJ46599782

Job ID: 160-40004-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

RECEIPT

The samples were received on 10/21/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 17.6 C.

TOTAL BETA STRONTIUM (GFPC)

Samples HPPG-SFU-TU153A-001 (160-40004-3), HPPG-SFU-TU153A-011 (160-40004-13) and HPPG-SFU-TU153A-021 (160-40004-23) were analyzed for Total Beta Strontium (GFPC) in accordance with EPA 905. The samples were dried on 10/26/2020, prepared on 11/06/2020 and analyzed on 11/26/2020.

When taking small mass aliquots from dried/disaggregated sample, the laboratory avoids large rocks/pebbles (as well as sticks, etc) which may constitute a larger than representative portion of the aliquot. Smaller rocks may be included. This is consistent with QSM and Laboratory SOP: HPPG-SFU-TU153A-001 (160-40004-3), HPPG-SFU-TU153A-011 (160-40004-13), HPPG-SFU-TU153A-021 (160-40004-23) and (160-40004-A-3-A DU).

The method blank (MB) z-score is within limits and is stored in the level IV raw data.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Samples HPPG-F-011 (160-40004-1), HPPG-F-012 (160-40004-2), HPPG-SFU-TU153A-001 (160-40004-3), HPPG-SFU-TU153A-002 (160-40004-4), HPPG-SFU-TU153A-003 (160-40004-5), HPPG-SFU-TU153A-004 (160-40004-6), HPPG-SFU-TU153A-005 (160-40004-7), HPPG-SFU-TU153A-006 (160-40004-8), HPPG-SFU-TU153A-007 (160-40004-9), HPPG-SFU-TU153A-008 (160-40004-10), HPPG-SFU-TU153A-009 (160-40004-11), HPPG-SFU-TU153A-010 (160-40004-12), HPPG-SFU-TU153A-011 (160-40004-13), HPPG-SFU-TU153A-012 (160-40004-14), HPPG-SFU-TU153A-013 (160-40004-15), HPPG-SFU-TU153A-014 (160-40004-16), HPPG-SFU-TU153A-015 (160-40004-17), HPPG-SFU-TU153A-016 (160-40004-18), HPPG-SFU-TU153A-017 (160-40004-19), HPPG-SFU-TU153A-018 (160-40004-20), HPPG-SFU-TU153A-019 (160-40004-21), HPPG-SFU-TU153A-020 (160-40004-22), HPPG-SFU-TU153A-021 (160-40004-23), HPPG-SFU-TU153A-022 (160-40004-24), HPPG-SFU-TU153A-023 (160-40004-25), HPPG-SFU-TU153A-024 (160-40004-26) and HPPG-SFU-TU153A-025 (160-40004-27) were analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA_01_R. The samples were dried on 10/26/2020, prepared on 10/31/2020 and analyzed on 11/23/2020 and 11/24/2020.

Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

Inferred from	Reported to Analyte
Th-234	Pa-234
Th-234	U-238
Pb-210	Po-210
Pb-210	Bi-210
Cs-137	Ba-137m
Pb-212	Po-216
Xe-131m	Xe-131
Sb-125	Te-125m
Ag-108m	Ag-108
Rh-106	Ru-106
Pb-212	Th-228
Pb-212	Ra-224
U-235	Th-231
Ac-228	Th-232
Ac-228	Ra-228
Th-227	Ra-223
Th-227	Ac-227
Th-227	Bi-211
Th-227	Pb-211

Case Narrative

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40004-1
SDG: GJ46599782

Job ID: 160-40004-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

Bi-214 Ra-226

Gamma Prep batch 487562

The following sample exhibited a negative result greater in magnitude than the 3 sigma TPU for Pb-210: (160-40004-A-20-C DU)
This occurrence was evaluated and determined to be random in nature. Sporadic occurrences such as this are statistically expected. No further action is required.

The replicate precision for Bi-214/Ra-226 does not meet QC criteria. This appears to be random in nature, and limited deviations such as this are statistically expected when larger analyte lists are reported. Such excursions are often caused by fluctuations in Compton background, force-fitting of peaks that are not found by the software peak-search algorithm, and inclusion of inferior peak results by the software in weighted averages. The laboratory SOP allows for such statistical exceedances.(160-40004-A-20-C DU)

The method blank (MB) z-score associated with Prep Batch 160-487562 is within limits and is stored in the level IV raw data. (MB 160-487562/1-A)

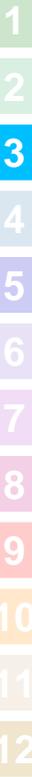
Gamma Prep batch 487563

The method blank (MB) z-score associated with Prep Batch 160-487563 is within limits and is stored in the level IV raw data. (MB 160-487563/1-A)

The cesium-137 detection goal of 0.0700 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline.
HPPG-SFU-TU153A-025 (160-40004-27)

The following sample exhibited a negative result greater in magnitude than the 3 sigma TPU (40006-2; Pb-210 and 40006-26; Th-234):
HPPG-SFU-TU153A-024 (160-40004-26). This occurrence was evaluated and determined to be random in nature. Sporadic occurrences such as this are statistically expected. No further action is required.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.





CHAIN OF CUSTODY

Ref. Document # 501197RSY-010

APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy

Sample Lead: Lewis, Devin

Sample Tech(s):

Project Number: 501197
Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action
Project Location: San Francisco, CA
Purchase Order #: 1159058
Shipment/Pickup Date: 10/20/2020
Waybill Number: 4957 0225 2278
Lab Destination: Test America (St. Louis Lab)
13715 Rider Trail North
Earth City, MO 63046

Lab Contact Name/ph # Rhoeda Ridenbower (314)298-8566

Analysis Requested

Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Total Strontium (EPA 905 MOD)								
	Strontium-90 (EPA 905 MOD)								



160-40004 Chain of Custody

Sample ID	Collection Information			Matrix	# of Containers	Container Type	X				Dose Rate uR/Hr	Evidence Bag ID	Comment
	Date	Time	Method										
HPPG-F-011	10/14/2020	13:22	G	SO	1	16 oz. plastic jar	X				4	GJ46599782	
HPPG-F-012	10/14/2020	14:37	G	SO	1	16 oz. plastic jar	X				4	GJ46599782	
HPPG-SFU-TU153A-001	10/14/2020	12:48	G	SO	1	16 oz. plastic jar	X	X	X		4	GJ46599782	
HPPG-SFU-TU153A-002	10/14/2020	12:53	G	SO	1	16 oz. plastic jar	X				4	GJ46599782	
HPPG-SFU-TU153A-003	10/14/2020	12:57	G	SO	1	16 oz. plastic jar	X				4	GJ46599782	
HPPG-SFU-TU153A-004	10/14/2020	13:02	G	SO	1	16 oz. plastic jar	X				4	GJ46599782	
HPPG-SFU-TU153A-005	10/14/2020	13:06	G	SO	1	16 oz. plastic jar	X				4	GJ46599782	
HPPG-SFU-TU153A-006	10/14/2020	13:10	G	SO	1	16 oz. plastic jar	X				4	GJ46599782	

Special Instructions: 21 day ingrowth results only
Analyze for Total Strontium as a screening step, and isotopic Sr-90 only if Total Strontium is above project action limit of 0.331 pCi/g

Turanaround Time: 3-day 10-Day 28-day Other **Level of QC Required:** I II III Project Specific

Method Codes C = Composite G = Grab **Matrix Codes:** DW = Drinking Water; So = Soil; GW = Ground Water; SL = Sludge; WW = Waste Water; CP = Chip Samples; A = Air; ABS = Asbestos; PO = Pipe Opening

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		10/15/2020 17:00	Locked Storage (RKillpack)		10/15/2020 17:00
Locked Storage (RKillpack)		10/20/2020 13:30	Devin Lewis		10/20/2020 13:30
Devin Lewis		10/20/2020 14:41	SHIPPEDTOLAB		10/21/2020 0907

*** Last 3 transfers shown above - Complete list of transfers on last page ***





CHAIN OF CUSTODY

Ref. Document # 501197RSY-010

APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy
City: Concord, CA 94520

Sample Lead: Lewis, Devin

Sample Tech(s):

Project Number: 501197
Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action
Project Location: San Francisco, CA
Purchase Order #: 1159058
Shipment/Pickup Date: 10/20/2020
Waybill Number: 4957 0225 2278
Lab Destination: Test America (St. Louis Lab)
13715 Rider Trail North
Earth City, MO 63046

Lab Contact Name/ph # Rhoeda Ridenbower (314)298-8566

Sample ID	Collection Information			Matrix	# of Containers	Analysis Requested							Dose Rate uR/Hr	Evidence Bag ID	Comment	
	Date	Time	Method			Container Type	Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Total Strontium (EPA 905 MOD)	Strontium-90 (EPA 905 MOD)							
	Preservatives (water)	Preservatives (soil)														
HPPG-SFU-TU153A-007	10/14/2020	13:14	G	SO	1	16 oz. plastic jar	X							4	GJ46599782	
HPPG-SFU-TU153A-008	10/14/2020	13:22	G	SO	1	16 oz. plastic jar	X							4	GJ46599782	
HPPG-SFU-TU153A-009	10/14/2020	14:02	G	SO	1	16 oz. plastic jar	X							4	GJ46599782	
HPPG-SFU-TU153A-010	10/14/2020	14:07	G	SO	1	16 oz. plastic jar	X							4	GJ46599782	
HPPG-SFU-TU153A-011	10/14/2020	14:12	G	SO	1	16 oz. plastic jar	X	X	X					4	GJ46599782	
HPPG-SFU-TU153A-012	10/14/2020	14:18	G	SO	1	16 oz. plastic jar	X							4	GJ46599782	
HPPG-SFU-TU153A-013	10/14/2020	14:23	G	SO	1	16 oz. plastic jar	X							4	GJ46599782	
HPPG-SFU-TU153A-014	10/14/2020	14:28	G	SO	1	16 oz. plastic jar	X							4	GJ46599782	
HPPG-SFU-TU153A-015	10/14/2020	14:31	G	SO	1	16 oz. plastic jar	X							4	GJ46599782	
HPPG-SFU-TU153A-016	10/14/2020	14:34	G	SO	1	16 oz. plastic jar	X							4	GJ46599782	
HPPG-SFU-TU153A-017	10/14/2020	14:37	G	SO	1	16 oz. plastic jar	X							4	GJ46599782	
HPPG-SFU-TU153A-018	10/14/2020	14:40	G	SO	1	16 oz. plastic jar	X							4	GJ46599782	
HPPG-SFU-TU153A-019	10/14/2020	14:42	G	SO	1	16 oz. plastic jar	X							4	GJ46599782	
HPPG-SFU-TU153A-020	10/14/2020	14:44	G	SO	1	16 oz. plastic jar	X							4	GJ46599782	
HPPG-SFU-TU153A-021	10/14/2020	14:46	G	SO	1	16 oz. plastic jar	X	X	X					4	GJ46599782	
HPPG-SFU-TU153A-022	10/14/2020	14:47	G	SO	1	16 oz. plastic jar	X							4	GJ46599782	
HPPG-SFU-TU153A-023	10/14/2020	14:49	G	SO	1	16 oz. plastic jar	X							4	GJ46599782	





CHAIN OF CUSTODY

Ref. Document # 501197RSY-010

APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy
City: Concord, CA 94520

Sample Lead: Lewis, Devin

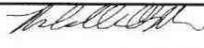
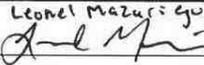
Sample Tech(s): Andrew Murri

Project Number: 501197
Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action
Project Location: San Francisco, CA
Purchase Order #: 1159058
Shipment/Pickup Date: 10/20/2020
Waybill Number: 4957 0225 2278
Lab Destination: Test America (St. Louis Lab)
13715 Rider Trail North
Earth City, MO 63046
Lab Contact Name/ph #: Rhoeda Ridenbower (314)298-8566

Sample ID	Collection Information			Matrix	# of Containers	Analysis Requested							Dose Rate uR/Hr	Evidence Bag ID	Comment	
	Date	Time	Method			Preservatives (water)	Preservatives (soil)	Container Type	Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Total Strontium (EPA 905 MOD)	Strontium-90 (EPA 905 MOD)					
HPPG-SFU-TU153A-024	10/14/2020	14:51	G	SO	1	16 oz. plastic jar	X							4	GJ46599782	
HPPG-SFU-TU153A-025	10/14/2020	14:53	G	SO	1	16 oz. plastic jar	X							4	GJ46599782	



All Transfers for COC 501197RSY-010

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		10/14/2020 15:56	Locked Storage (RKillpack)		10/14/2020 15:56
Locked Storage (RKillpack)		10/15/2020 14:47	Devin Lewis		10/15/2020 14:47
Lewis, Devin		10/15/2020 17:00	Locked Storage (RKillpack)		10/15/2020 17:00
Locked Storage (RKillpack)		10/20/2020 13:30	Devin Lewis		10/20/2020 13:30
Devin Lewis		10/20/2020 14:41	SHIPPEDTOLAB	Leonel Mazurcigus 	10/21/2020 09:02



Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-40004-1

SDG Number: GJ46599782

Login Number: 40004**List Source: Eurofins TestAmerica, St. Louis****List Number: 1****Creator: Korrinhizer, Micha L**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40004-1
SDG: GJ46599782

Qualifiers

Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Method Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40004-1
SDG: GJ46599782

Method	Method Description	Protocol	Laboratory
905.0	Total Beta Strontium (GFPC)	DOE	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-0	Preparation, Digestion/ Precipitate	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy
None = None

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566



Sample Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40004-1
SDG: GJ46599782

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-40004-1	HPPG-F-011	Solid	10/14/20 13:22	10/21/20 09:07	
160-40004-2	HPPG-F-012	Solid	10/14/20 14:37	10/21/20 09:07	
160-40004-3	HPPG-SFU-TU153A-001	Solid	10/14/20 12:48	10/21/20 09:07	
160-40004-4	HPPG-SFU-TU153A-002	Solid	10/14/20 12:53	10/21/20 09:07	
160-40004-5	HPPG-SFU-TU153A-003	Solid	10/14/20 12:57	10/21/20 09:07	
160-40004-6	HPPG-SFU-TU153A-004	Solid	10/14/20 13:02	10/21/20 09:07	
160-40004-7	HPPG-SFU-TU153A-005	Solid	10/14/20 13:06	10/21/20 09:07	
160-40004-8	HPPG-SFU-TU153A-006	Solid	10/14/20 13:10	10/21/20 09:07	
160-40004-9	HPPG-SFU-TU153A-007	Solid	10/14/20 13:14	10/21/20 09:07	
160-40004-10	HPPG-SFU-TU153A-008	Solid	10/14/20 13:22	10/21/20 09:07	
160-40004-11	HPPG-SFU-TU153A-009	Solid	10/14/20 14:02	10/21/20 09:07	
160-40004-12	HPPG-SFU-TU153A-010	Solid	10/14/20 14:07	10/21/20 09:07	
160-40004-13	HPPG-SFU-TU153A-011	Solid	10/14/20 14:12	10/21/20 09:07	
160-40004-14	HPPG-SFU-TU153A-012	Solid	10/14/20 14:18	10/21/20 09:07	
160-40004-15	HPPG-SFU-TU153A-013	Solid	10/14/20 14:23	10/21/20 09:07	
160-40004-16	HPPG-SFU-TU153A-014	Solid	10/14/20 14:28	10/21/20 09:07	
160-40004-17	HPPG-SFU-TU153A-015	Solid	10/14/20 14:31	10/21/20 09:07	
160-40004-18	HPPG-SFU-TU153A-016	Solid	10/14/20 14:34	10/21/20 09:07	
160-40004-19	HPPG-SFU-TU153A-017	Solid	10/14/20 14:37	10/21/20 09:07	
160-40004-20	HPPG-SFU-TU153A-018	Solid	10/14/20 14:40	10/21/20 09:07	
160-40004-21	HPPG-SFU-TU153A-019	Solid	10/14/20 14:42	10/21/20 09:07	
160-40004-22	HPPG-SFU-TU153A-020	Solid	10/14/20 14:44	10/21/20 09:07	
160-40004-23	HPPG-SFU-TU153A-021	Solid	10/14/20 14:46	10/21/20 09:07	
160-40004-24	HPPG-SFU-TU153A-022	Solid	10/14/20 14:47	10/21/20 09:07	
160-40004-25	HPPG-SFU-TU153A-023	Solid	10/14/20 14:49	10/21/20 09:07	
160-40004-26	HPPG-SFU-TU153A-024	Solid	10/14/20 14:51	10/21/20 09:07	
160-40004-27	HPPG-SFU-TU153A-025	Solid	10/14/20 14:53	10/21/20 09:07	

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40004-1
 SDG: GJ46599782

Client Sample ID: HPPG-F-011

Lab Sample ID: 160-40004-1

Date Collected: 10/14/20 13:22

Matrix: Solid

Date Received: 10/21/20 09:07

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.116	U	0.258	0.258		0.230	pCi/g	10/31/20 10:35	11/24/20 14:32	1
Actinium 228	0.133		0.169	0.169		0.0772	pCi/g	10/31/20 10:35	11/24/20 14:32	1
Bismuth-212	0.230	U	0.436	0.437		0.316	pCi/g	10/31/20 10:35	11/24/20 14:32	1
Bismuth-214	0.0915	U	0.0845	0.0851		0.122	pCi/g	10/31/20 10:35	11/24/20 14:32	1
Cesium-137	-0.0534	U	0.0406	0.0410	0.0700	0.0672	pCi/g	10/31/20 10:35	11/24/20 14:32	1
Lead-210	-0.0759	U	1.05	1.05		0.748	pCi/g	10/31/20 10:35	11/24/20 14:32	1
Lead-212	0.180		0.0674	0.0713		0.0387	pCi/g	10/31/20 10:35	11/24/20 14:32	1
Lead-214	0.208		0.0953	0.0978		0.0438	pCi/g	10/31/20 10:35	11/24/20 14:32	1
Potassium-40	6.11		1.24	1.39		0.231	pCi/g	10/31/20 10:35	11/24/20 14:32	1
Protactinium-231	0.456	U	1.43	1.43		1.57	pCi/g	10/31/20 10:35	11/24/20 14:32	1
Protactinium-234	0.0508	U	0.134	0.134		0.107	pCi/g	10/31/20 10:35	11/24/20 14:32	1
Radium-226	0.0915	U	0.0845	0.0851	0.200	0.122	pCi/g	10/31/20 10:35	11/24/20 14:32	1
Radium-228	0.133		0.169	0.169		0.0772	pCi/g	10/31/20 10:35	11/24/20 14:32	1
Thallium-208	0.0879		0.0593	0.0600		0.0287	pCi/g	10/31/20 10:35	11/24/20 14:32	1
Thorium-232	0.133		0.169	0.169		0.0772	pCi/g	10/31/20 10:35	11/24/20 14:32	1
Thorium-234	0.0362	U	0.0721	0.0722		0.543	pCi/g	10/31/20 10:35	11/24/20 14:32	1
Thorium 228	0.180		0.0674	0.0713		0.0387	pCi/g	10/31/20 10:35	11/24/20 14:32	1
Uranium-235	0.0768	U	0.192	0.192		0.193	pCi/g	10/31/20 10:35	11/24/20 14:32	1
Uranium-238	0.0362	U	0.0721	0.0722		0.543	pCi/g	10/31/20 10:35	11/24/20 14:32	1

Client Sample ID: HPPG-F-012

Lab Sample ID: 160-40004-2

Date Collected: 10/14/20 14:37

Matrix: Solid

Date Received: 10/21/20 09:07

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.211	U	0.413	0.414		0.238	pCi/g	10/31/20 10:35	11/24/20 14:36	1
Actinium 228	0.109		0.137	0.138		0.0788	pCi/g	10/31/20 10:35	11/24/20 14:36	1
Bismuth-212	0.309	U	0.542	0.543		0.423	pCi/g	10/31/20 10:35	11/24/20 14:36	1
Bismuth-214	0.228		0.0691	0.0731		0.0277	pCi/g	10/31/20 10:35	11/24/20 14:36	1
Cesium-137	0.0191	U	0.0304	0.0304	0.0700	0.0228	pCi/g	10/31/20 10:35	11/24/20 14:36	1
Lead-210	0.413	U	0.899	0.900		0.719	pCi/g	10/31/20 10:35	11/24/20 14:36	1
Lead-212	0.232		0.0516	0.0597		0.0245	pCi/g	10/31/20 10:35	11/24/20 14:36	1
Lead-214	0.220		0.0709	0.0745		0.0320	pCi/g	10/31/20 10:35	11/24/20 14:36	1
Potassium-40	6.09		0.853	1.06		0.0695	pCi/g	10/31/20 10:35	11/24/20 14:36	1
Protactinium-231	0.250	U	0.826	0.827		1.32	pCi/g	10/31/20 10:35	11/24/20 14:36	1
Protactinium-234	0.0553	U	0.115	0.115		0.116	pCi/g	10/31/20 10:35	11/24/20 14:36	1
Radium-226	0.228		0.0691	0.0731	0.200	0.0277	pCi/g	10/31/20 10:35	11/24/20 14:36	1
Radium-228	0.109		0.137	0.138		0.0788	pCi/g	10/31/20 10:35	11/24/20 14:36	1
Thallium-208	0.0370		0.0337	0.0339		0.0161	pCi/g	10/31/20 10:35	11/24/20 14:36	1
Thorium-232	0.109		0.137	0.138		0.0788	pCi/g	10/31/20 10:35	11/24/20 14:36	1
Thorium-234	0.137	U	0.321	0.321		0.567	pCi/g	10/31/20 10:35	11/24/20 14:36	1
Thorium 228	0.232		0.0516	0.0597		0.0245	pCi/g	10/31/20 10:35	11/24/20 14:36	1
Uranium-235	0.119	U	0.231	0.232		0.232	pCi/g	10/31/20 10:35	11/24/20 14:36	1
Uranium-238	0.137	U	0.321	0.321		0.567	pCi/g	10/31/20 10:35	11/24/20 14:36	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40004-1
 SDG: GJ46599782

Client Sample ID: HPPG-SFU-TU153A-001

Lab Sample ID: 160-40004-3

Date Collected: 10/14/20 12:48

Matrix: Solid

Date Received: 10/21/20 09:07

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Total Beta Strontium	-0.0609	U	0.0592	0.0593	0.160	0.0535	pCi/g	11/06/20 11:01	11/26/20 10:42	1
Carrier	%Yield	Qualifier	Limits							
Sr Carrier	89.8		40 - 110							
					Prepared	Analyzed		Dil Fac		
					11/06/20 11:01	11/26/20 10:42		1		

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.116	U	0.252	0.252		0.219	pCi/g	10/31/20 10:35	11/24/20 15:08	1
Actinium 228	0.153		0.105	0.106		0.0664	pCi/g	10/31/20 10:35	11/24/20 15:08	1
Bismuth-212	0.174	U	0.447	0.447		0.351	pCi/g	10/31/20 10:35	11/24/20 15:08	1
Bismuth-214	0.0161	U	0.0801	0.0801		0.0803	pCi/g	10/31/20 10:35	11/24/20 15:08	1
Cesium-137	0.00176	U	0.0411	0.0411	0.0700	0.0337	pCi/g	10/31/20 10:35	11/24/20 15:08	1
Lead-210	-0.326	U	1.04	1.04		0.838	pCi/g	10/31/20 10:35	11/24/20 15:08	1
Lead-212	0.121		0.0479	0.0503		0.0296	pCi/g	10/31/20 10:35	11/24/20 15:08	1
Lead-214	0.239		0.0655	0.0700		0.0252	pCi/g	10/31/20 10:35	11/24/20 15:08	1
Potassium-40	5.22		0.847	1.00		0.204	pCi/g	10/31/20 10:35	11/24/20 15:08	1
Protactinium-231	0.0927	U	0.0793	0.0800		1.31	pCi/g	10/31/20 10:35	11/24/20 15:08	1
Protactinium-234	0.0682	U	0.140	0.140		0.124	pCi/g	10/31/20 10:35	11/24/20 15:08	1
Radium-226	0.0161	U	0.0801	0.0801	0.200	0.0803	pCi/g	10/31/20 10:35	11/24/20 15:08	1
Radium-228	0.153		0.105	0.106		0.0664	pCi/g	10/31/20 10:35	11/24/20 15:08	1
Thallium-208	0.00395	U	0.0509	0.0509		0.0281	pCi/g	10/31/20 10:35	11/24/20 15:08	1
Thorium-232	0.153		0.105	0.106		0.0664	pCi/g	10/31/20 10:35	11/24/20 15:08	1
Thorium-234	0.146	U	0.492	0.492		0.399	pCi/g	10/31/20 10:35	11/24/20 15:08	1
Thorium 228	0.121		0.0479	0.0503		0.0296	pCi/g	10/31/20 10:35	11/24/20 15:08	1
Uranium-235	0.0892	U	0.221	0.221		0.178	pCi/g	10/31/20 10:35	11/24/20 15:08	1
Uranium-238	0.146	U	0.492	0.492		0.399	pCi/g	10/31/20 10:35	11/24/20 15:08	1

Client Sample ID: HPPG-SFU-TU153A-002

Lab Sample ID: 160-40004-4

Date Collected: 10/14/20 12:53

Matrix: Solid

Date Received: 10/21/20 09:07

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.215	U	0.411	0.412		0.237	pCi/g	10/31/20 10:35	11/24/20 15:12	1
Actinium 228	0.336		0.0992	0.105		0.0170	pCi/g	10/31/20 10:35	11/24/20 15:12	1
Bismuth-212	0.185	U	0.468	0.469		0.370	pCi/g	10/31/20 10:35	11/24/20 15:12	1
Bismuth-214	0.0518	U	0.0312	0.0317		0.0774	pCi/g	10/31/20 10:35	11/24/20 15:12	1
Cesium-137	0.000	U	0.00780	0.00780	0.0700	0.0280	pCi/g	10/31/20 10:35	11/24/20 15:12	1
Lead-210	-0.119	U	0.810	0.810		0.661	pCi/g	10/31/20 10:35	11/24/20 15:12	1
Lead-212	0.228		0.0495	0.0576		0.0227	pCi/g	10/31/20 10:35	11/24/20 15:12	1
Lead-214	0.176		0.0578	0.0606		0.0327	pCi/g	10/31/20 10:35	11/24/20 15:12	1
Potassium-40	6.38		0.859	1.08		0.0673	pCi/g	10/31/20 10:35	11/24/20 15:12	1
Protactinium-231	0.0000000	U	1.62	1.62		1.33	pCi/g	10/31/20 10:35	11/24/20 15:12	1
	312									
Protactinium-234	0.0666	U	0.138	0.138		0.137	pCi/g	10/31/20 10:35	11/24/20 15:12	1

Eurofins TestAmerica, St. Louis

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40004-1
 SDG: GJ46599782

Client Sample ID: HPPG-SFU-TU153A-002

Lab Sample ID: 160-40004-4

Date Collected: 10/14/20 12:53

Matrix: Solid

Date Received: 10/21/20 09:07

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Radium-226	0.0518	U	0.0312	0.0317	0.200	0.0774	pCi/g	10/31/20 10:35	11/24/20 15:12	1
Radium-228	0.336		0.0992	0.105		0.0170	pCi/g	10/31/20 10:35	11/24/20 15:12	1
Thallium-208	0.0573		0.0561	0.0564		0.0255	pCi/g	10/31/20 10:35	11/24/20 15:12	1
Thorium-232	0.336		0.0992	0.105		0.0170	pCi/g	10/31/20 10:35	11/24/20 15:12	1
Thorium-234	0.000	U	0.307	0.307		0.573	pCi/g	10/31/20 10:35	11/24/20 15:12	1
Thorium 228	0.228		0.0495	0.0576		0.0227	pCi/g	10/31/20 10:35	11/24/20 15:12	1
Uranium-235	0.0677	U	0.122	0.122		0.235	pCi/g	10/31/20 10:35	11/24/20 15:12	1
Uranium-238	0.000	U	0.307	0.307		0.573	pCi/g	10/31/20 10:35	11/24/20 15:12	1

Client Sample ID: HPPG-SFU-TU153A-003

Lab Sample ID: 160-40004-5

Date Collected: 10/14/20 12:57

Matrix: Solid

Date Received: 10/21/20 09:07

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.0248	U	0.0646	0.0647		0.211	pCi/g	10/31/20 10:35	11/24/20 16:26	1
Actinium 228	0.314		0.143	0.147		0.0665	pCi/g	10/31/20 10:35	11/24/20 16:26	1
Bismuth-212	0.246	U	0.396	0.396		0.299	pCi/g	10/31/20 10:35	11/24/20 16:26	1
Bismuth-214	0.167		0.0641	0.0664		0.0361	pCi/g	10/31/20 10:35	11/24/20 16:26	1
Cesium-137	-0.0141	U	0.0377	0.0377	0.0700	0.0297	pCi/g	10/31/20 10:35	11/24/20 16:26	1
Lead-210	-0.430	U	0.971	0.972		0.778	pCi/g	10/31/20 10:35	11/24/20 16:26	1
Lead-212	0.204		0.0528	0.0590		0.0276	pCi/g	10/31/20 10:35	11/24/20 16:26	1
Lead-214	0.208		0.0612	0.0649		0.0361	pCi/g	10/31/20 10:35	11/24/20 16:26	1
Potassium-40	5.44		0.863	1.03		0.204	pCi/g	10/31/20 10:35	11/24/20 16:26	1
Protactinium-231	-0.592	U	1.86	1.86		1.52	pCi/g	10/31/20 10:35	11/24/20 16:26	1
Protactinium-234	-0.0699	U	0.195	0.195		0.159	pCi/g	10/31/20 10:35	11/24/20 16:26	1
Radium-226	0.167		0.0641	0.0664	0.200	0.0361	pCi/g	10/31/20 10:35	11/24/20 16:26	1
Radium-228	0.314		0.143	0.147		0.0665	pCi/g	10/31/20 10:35	11/24/20 16:26	1
Thallium-208	0.0989		0.0359	0.0374		0.0117	pCi/g	10/31/20 10:35	11/24/20 16:26	1
Thorium-232	0.314		0.143	0.147		0.0665	pCi/g	10/31/20 10:35	11/24/20 16:26	1
Thorium-234	0.188	U	0.669	0.669		0.546	pCi/g	10/31/20 10:35	11/24/20 16:26	1
Thorium 228	0.204		0.0528	0.0590		0.0276	pCi/g	10/31/20 10:35	11/24/20 16:26	1
Uranium-235	0.0446	U	0.191	0.191		0.146	pCi/g	10/31/20 10:35	11/24/20 16:26	1
Uranium-238	0.188	U	0.669	0.669		0.546	pCi/g	10/31/20 10:35	11/24/20 16:26	1

Client Sample ID: HPPG-SFU-TU153A-004

Lab Sample ID: 160-40004-6

Date Collected: 10/14/20 13:02

Matrix: Solid

Date Received: 10/21/20 09:07

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.140	U	0.394	0.395		0.256	pCi/g	10/31/20 10:35	11/24/20 16:30	1
Actinium 228	0.307		0.162	0.165		0.0737	pCi/g	10/31/20 10:35	11/24/20 16:30	1
Bismuth-212	0.000	U	0.380	0.380		0.314	pCi/g	10/31/20 10:35	11/24/20 16:30	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40004-1
 SDG: GJ46599782

Client Sample ID: HPPG-SFU-TU153A-004

Lab Sample ID: 160-40004-6

Date Collected: 10/14/20 13:02

Matrix: Solid

Date Received: 10/21/20 09:07

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Bismuth-214	0.198		0.0892	0.0916		0.0415	pCi/g	10/31/20 10:35	11/24/20 16:30	1
Cesium-137	0.00194	U	0.0539	0.0539	0.0700	0.0443	pCi/g	10/31/20 10:35	11/24/20 16:30	1
Lead-210	0.681	U	1.10	1.10		0.739	pCi/g	10/31/20 10:35	11/24/20 16:30	1
Lead-212	0.191		0.0607	0.0655		0.0333	pCi/g	10/31/20 10:35	11/24/20 16:30	1
Lead-214	0.296		0.0901	0.0952		0.0377	pCi/g	10/31/20 10:35	11/24/20 16:30	1
Potassium-40	7.86		1.17	1.42		0.243	pCi/g	10/31/20 10:35	11/24/20 16:30	1
Protactinium-231	-0.760	U	2.83	2.83		2.31	pCi/g	10/31/20 10:35	11/24/20 16:30	1
Protactinium-234	0.0966	U	0.162	0.162		0.188	pCi/g	10/31/20 10:35	11/24/20 16:30	1
Radium-226	0.198		0.0892	0.0916	0.200	0.0415	pCi/g	10/31/20 10:35	11/24/20 16:30	1
Radium-228	0.307		0.162	0.165		0.0737	pCi/g	10/31/20 10:35	11/24/20 16:30	1
Thallium-208	0.111		0.0476	0.0489		0.0201	pCi/g	10/31/20 10:35	11/24/20 16:30	1
Thorium-232	0.307		0.162	0.165		0.0737	pCi/g	10/31/20 10:35	11/24/20 16:30	1
Thorium-234	0.298	U	0.425	0.427		0.346	pCi/g	10/31/20 10:35	11/24/20 16:30	1
Thorium 228	0.191		0.0607	0.0655		0.0333	pCi/g	10/31/20 10:35	11/24/20 16:30	1
Uranium-235	0.0419	U	0.181	0.181		0.230	pCi/g	10/31/20 10:35	11/24/20 16:30	1
Uranium-238	0.298	U	0.425	0.427		0.346	pCi/g	10/31/20 10:35	11/24/20 16:30	1

Client Sample ID: HPPG-SFU-TU153A-005

Lab Sample ID: 160-40004-7

Date Collected: 10/14/20 13:06

Matrix: Solid

Date Received: 10/21/20 09:07

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.275	U	0.541	0.542		0.324	pCi/g	10/31/20 10:35	11/24/20 16:30	1
Actinium 228	0.155		0.204	0.204		0.128	pCi/g	10/31/20 10:35	11/24/20 16:30	1
Bismuth-212	0.536	U	1.09	1.09		0.863	pCi/g	10/31/20 10:35	11/24/20 16:30	1
Bismuth-214	0.297		0.0918	0.0980		0.0333	pCi/g	10/31/20 10:35	11/24/20 16:30	1
Cesium-137	0.00204	U	0.0457	0.0457	0.0700	0.0373	pCi/g	10/31/20 10:35	11/24/20 16:30	1
Lead-210	0.945		1.21	1.22		0.807	pCi/g	10/31/20 10:35	11/24/20 16:30	1
Lead-212	0.208		0.0816	0.0851		0.0417	pCi/g	10/31/20 10:35	11/24/20 16:30	1
Lead-214	0.159		0.0837	0.0856		0.0485	pCi/g	10/31/20 10:35	11/24/20 16:30	1
Potassium-40	6.33		1.17	1.38		0.246	pCi/g	10/31/20 10:35	11/24/20 16:30	1
Protactinium-231	-0.0000000	U	2.27	2.27		1.87	pCi/g	10/31/20 10:35	11/24/20 16:30	1
	133									
Protactinium-234	-0.0989	U	0.300	0.300		0.244	pCi/g	10/31/20 10:35	11/24/20 16:30	1
Radium-226	0.297		0.0918	0.0980	0.200	0.0333	pCi/g	10/31/20 10:35	11/24/20 16:30	1
Radium-228	0.155		0.204	0.204		0.128	pCi/g	10/31/20 10:35	11/24/20 16:30	1
Thallium-208	0.0698		0.0839	0.0842		0.0337	pCi/g	10/31/20 10:35	11/24/20 16:30	1
Thorium-232	0.155		0.204	0.204		0.128	pCi/g	10/31/20 10:35	11/24/20 16:30	1
Thorium-234	-0.155	U	0.895	0.895		0.740	pCi/g	10/31/20 10:35	11/24/20 16:30	1
Thorium 228	0.208		0.0816	0.0851		0.0417	pCi/g	10/31/20 10:35	11/24/20 16:30	1
Uranium-235	-0.0100	U	0.473	0.473		0.459	pCi/g	10/31/20 10:35	11/24/20 16:30	1
Uranium-238	-0.155	U	0.895	0.895		0.740	pCi/g	10/31/20 10:35	11/24/20 16:30	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40004-1
 SDG: GJ46599782

Client Sample ID: HPPG-SFU-TU153A-006

Lab Sample ID: 160-40004-8

Date Collected: 10/14/20 13:10

Matrix: Solid

Date Received: 10/21/20 09:07

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.0743	U	0.327	0.328		0.191	pCi/g	10/31/20 10:35	11/24/20 17:26	1
Actinium 228	0.170		0.108	0.110		0.0742	pCi/g	10/31/20 10:35	11/24/20 17:26	1
Bismuth-212	-0.0162	U	0.417	0.417		0.342	pCi/g	10/31/20 10:35	11/24/20 17:26	1
Bismuth-214	0.157		0.0656	0.0676		0.0290	pCi/g	10/31/20 10:35	11/24/20 17:26	1
Cesium-137	-0.0167	U	0.0444	0.0444	0.0700	0.0353	pCi/g	10/31/20 10:35	11/24/20 17:26	1
Lead-210	-0.498	U	1.10	1.10		0.886	pCi/g	10/31/20 10:35	11/24/20 17:26	1
Lead-212	0.154		0.0436	0.0479		0.0219	pCi/g	10/31/20 10:35	11/24/20 17:26	1
Lead-214	0.214		0.0541	0.0585		0.0200	pCi/g	10/31/20 10:35	11/24/20 17:26	1
Potassium-40	6.29		0.897	1.10		0.194	pCi/g	10/31/20 10:35	11/24/20 17:26	1
Protactinium-231	0.412	U	1.11	1.11		1.21	pCi/g	10/31/20 10:35	11/24/20 17:26	1
Protactinium-234	0.00678	U	0.0119	0.0119		0.137	pCi/g	10/31/20 10:35	11/24/20 17:26	1
Radium-226	0.157		0.0656	0.0676	0.200	0.0290	pCi/g	10/31/20 10:35	11/24/20 17:26	1
Radium-228	0.170		0.108	0.110		0.0742	pCi/g	10/31/20 10:35	11/24/20 17:26	1
Thallium-208	0.0545		0.0241	0.0247		0.00886	pCi/g	10/31/20 10:35	11/24/20 17:26	1
Thorium-232	0.170		0.108	0.110		0.0742	pCi/g	10/31/20 10:35	11/24/20 17:26	1
Thorium-234	0.141	U	0.305	0.305		0.585	pCi/g	10/31/20 10:35	11/24/20 17:26	1
Thorium 228	0.154		0.0436	0.0479		0.0219	pCi/g	10/31/20 10:35	11/24/20 17:26	1
Uranium-235	0.000	U	0.0547	0.0547		0.243	pCi/g	10/31/20 10:35	11/24/20 17:26	1
Uranium-238	0.141	U	0.305	0.305		0.585	pCi/g	10/31/20 10:35	11/24/20 17:26	1

Client Sample ID: HPPG-SFU-TU153A-007

Lab Sample ID: 160-40004-9

Date Collected: 10/14/20 13:14

Matrix: Solid

Date Received: 10/21/20 09:07

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.0515	U	0.307	0.307		0.180	pCi/g	10/31/20 10:35	11/24/20 17:27	1
Actinium 228	0.158		0.120	0.121		0.0578	pCi/g	10/31/20 10:35	11/24/20 17:27	1
Bismuth-212	0.203	U	0.321	0.322		0.236	pCi/g	10/31/20 10:35	11/24/20 17:27	1
Bismuth-214	0.172		0.0667	0.0691		0.0322	pCi/g	10/31/20 10:35	11/24/20 17:27	1
Cesium-137	0.000	U	0.0237	0.0237	0.0700	0.0135	pCi/g	10/31/20 10:35	11/24/20 17:27	1
Lead-210	-0.0881	U	0.938	0.938		0.768	pCi/g	10/31/20 10:35	11/24/20 17:27	1
Lead-212	0.178		0.0466	0.0520		0.0227	pCi/g	10/31/20 10:35	11/24/20 17:27	1
Lead-214	0.108		0.0578	0.0588		0.0585	pCi/g	10/31/20 10:35	11/24/20 17:27	1
Potassium-40	5.21		0.803	0.964		0.0722	pCi/g	10/31/20 10:35	11/24/20 17:27	1
Protactinium-231	0.0000000	U	1.49	1.49		1.23	pCi/g	10/31/20 10:35	11/24/20 17:27	1
Protactinium-234	0.116	U	0.0618	0.0629		0.138	pCi/g	10/31/20 10:35	11/24/20 17:27	1
Radium-226	0.172		0.0667	0.0691	0.200	0.0322	pCi/g	10/31/20 10:35	11/24/20 17:27	1
Radium-228	0.158		0.120	0.121		0.0578	pCi/g	10/31/20 10:35	11/24/20 17:27	1
Thallium-208	0.0836		0.0318	0.0330		0.00913	pCi/g	10/31/20 10:35	11/24/20 17:27	1
Thorium-232	0.158		0.120	0.121		0.0578	pCi/g	10/31/20 10:35	11/24/20 17:27	1
Thorium-234	-0.0219	U	0.0460	0.0461		0.691	pCi/g	10/31/20 10:35	11/24/20 17:27	1
Thorium 228	0.178		0.0466	0.0520		0.0227	pCi/g	10/31/20 10:35	11/24/20 17:27	1
Uranium-235	-0.0439	U	0.0867	0.0868		0.282	pCi/g	10/31/20 10:35	11/24/20 17:27	1
Uranium-238	-0.0219	U	0.0460	0.0461		0.691	pCi/g	10/31/20 10:35	11/24/20 17:27	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40004-1
 SDG: GJ46599782

Client Sample ID: HPPG-SFU-TU153A-008

Lab Sample ID: 160-40004-10

Date Collected: 10/14/20 13:22

Matrix: Solid

Date Received: 10/21/20 09:07

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.0385	U	0.277	0.277		0.317	pCi/g	10/31/20 10:35	11/24/20 17:58	1
Actinium 228	0.187		0.163	0.164		0.0876	pCi/g	10/31/20 10:35	11/24/20 17:58	1
Bismuth-212	0.315	U	0.531	0.533		0.394	pCi/g	10/31/20 10:35	11/24/20 17:58	1
Bismuth-214	0.306		0.118	0.123		0.0427	pCi/g	10/31/20 10:35	11/24/20 17:58	1
Cesium-137	0.00899	U	0.0695	0.0695	0.0700	0.0564	pCi/g	10/31/20 10:35	11/24/20 17:58	1
Lead-210	-0.945	U	1.42	1.43		1.21	pCi/g	10/31/20 10:35	11/24/20 17:58	1
Lead-212	0.272		0.0737	0.0803		0.0361	pCi/g	10/31/20 10:35	11/24/20 17:58	1
Lead-214	0.208		0.0793	0.0828		0.0368	pCi/g	10/31/20 10:35	11/24/20 17:58	1
Potassium-40	5.42		1.10	1.26		0.251	pCi/g	10/31/20 10:35	11/24/20 17:58	1
Protactinium-231	0.304	U	1.26	1.26		1.97	pCi/g	10/31/20 10:35	11/24/20 17:58	1
Protactinium-234	0.0808	U	0.245	0.246		0.199	pCi/g	10/31/20 10:35	11/24/20 17:58	1
Radium-226	0.306		0.118	0.123	0.200	0.0427	pCi/g	10/31/20 10:35	11/24/20 17:58	1
Radium-228	0.187		0.163	0.164		0.0876	pCi/g	10/31/20 10:35	11/24/20 17:58	1
Thallium-208	0.0883		0.0586	0.0595		0.0305	pCi/g	10/31/20 10:35	11/24/20 17:58	1
Thorium-232	0.187		0.163	0.164		0.0876	pCi/g	10/31/20 10:35	11/24/20 17:58	1
Thorium-234	-0.469	U	0.715	0.717		0.732	pCi/g	10/31/20 10:35	11/24/20 17:58	1
Thorium 228	0.272		0.0737	0.0803		0.0361	pCi/g	10/31/20 10:35	11/24/20 17:58	1
Uranium-235	-0.0102	U	0.379	0.379		0.369	pCi/g	10/31/20 10:35	11/24/20 17:58	1
Uranium-238	-0.469	U	0.715	0.717		0.732	pCi/g	10/31/20 10:35	11/24/20 17:58	1

Client Sample ID: HPPG-SFU-TU153A-009

Lab Sample ID: 160-40004-11

Date Collected: 10/14/20 14:02

Matrix: Solid

Date Received: 10/21/20 09:07

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.0141	U	0.375	0.375		0.244	pCi/g	10/31/20 10:35	11/24/20 17:35	1
Actinium 228	0.0876	U	0.169	0.169		0.131	pCi/g	10/31/20 10:35	11/24/20 17:35	1
Bismuth-212	0.204	U	0.486	0.487		0.371	pCi/g	10/31/20 10:35	11/24/20 17:35	1
Bismuth-214	0.251		0.0854	0.0891		0.0246	pCi/g	10/31/20 10:35	11/24/20 17:35	1
Cesium-137	0.0186	U	0.0468	0.0469	0.0700	0.0363	pCi/g	10/31/20 10:35	11/24/20 17:35	1
Lead-210	0.767		1.00	1.01		0.683	pCi/g	10/31/20 10:35	11/24/20 17:35	1
Lead-212	0.182		0.0568	0.0599		0.0297	pCi/g	10/31/20 10:35	11/24/20 17:35	1
Lead-214	0.273		0.0790	0.0838		0.0438	pCi/g	10/31/20 10:35	11/24/20 17:35	1
Potassium-40	6.72		1.22	1.40		0.188	pCi/g	10/31/20 10:35	11/24/20 17:35	1
Protactinium-231	0.415	U	1.63	1.63		1.67	pCi/g	10/31/20 10:35	11/24/20 17:35	1
Protactinium-234	0.0155	U	0.0311	0.0311		0.163	pCi/g	10/31/20 10:35	11/24/20 17:35	1
Radium-226	0.251		0.0854	0.0891	0.200	0.0246	pCi/g	10/31/20 10:35	11/24/20 17:35	1
Radium-228	0.0876	U	0.169	0.169		0.131	pCi/g	10/31/20 10:35	11/24/20 17:35	1
Thallium-208	0.0478		0.0427	0.0430		0.0337	pCi/g	10/31/20 10:35	11/24/20 17:35	1
Thorium-232	0.0876	U	0.169	0.169		0.131	pCi/g	10/31/20 10:35	11/24/20 17:35	1
Thorium-234	0.656		0.402	0.408		0.263	pCi/g	10/31/20 10:35	11/24/20 17:35	1
Thorium 228	0.182		0.0568	0.0599		0.0297	pCi/g	10/31/20 10:35	11/24/20 17:35	1
Uranium-235	0.00782	U	0.384	0.384		0.316	pCi/g	10/31/20 10:35	11/24/20 17:35	1
Uranium-238	0.656		0.402	0.408		0.263	pCi/g	10/31/20 10:35	11/24/20 17:35	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40004-1
 SDG: GJ46599782

Client Sample ID: HPPG-SFU-TU153A-010

Lab Sample ID: 160-40004-12

Date Collected: 10/14/20 14:07

Matrix: Solid

Date Received: 10/21/20 09:07

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.361		0.314	0.317		0.172	pCi/g	10/31/20 10:35	11/24/20 17:31	1
Actinium 228	0.171		0.0832	0.0851		0.100	pCi/g	10/31/20 10:35	11/24/20 17:31	1
Bismuth-212	0.0205	U	0.526	0.526		0.431	pCi/g	10/31/20 10:35	11/24/20 17:31	1
Bismuth-214	0.178		0.0726	0.0749		0.0302	pCi/g	10/31/20 10:35	11/24/20 17:31	1
Cesium-137	-0.0346	U	0.0624	0.0625	0.0700	0.0490	pCi/g	10/31/20 10:35	11/24/20 17:31	1
Lead-210	0.598	U	1.12	1.12		0.736	pCi/g	10/31/20 10:35	11/24/20 17:31	1
Lead-212	0.248		0.0619	0.0697		0.0307	pCi/g	10/31/20 10:35	11/24/20 17:31	1
Lead-214	0.223		0.0728	0.0764		0.0356	pCi/g	10/31/20 10:35	11/24/20 17:31	1
Potassium-40	7.20		1.07	1.30		0.226	pCi/g	10/31/20 10:35	11/24/20 17:31	1
Protactinium-231	0.000	U	0.210	0.210		1.56	pCi/g	10/31/20 10:35	11/24/20 17:31	1
Protactinium-234	0.0729	U	0.106	0.106		0.121	pCi/g	10/31/20 10:35	11/24/20 17:31	1
Radium-226	0.178		0.0726	0.0749	0.200	0.0302	pCi/g	10/31/20 10:35	11/24/20 17:31	1
Radium-228	0.171		0.0832	0.0851		0.100	pCi/g	10/31/20 10:35	11/24/20 17:31	1
Thallium-208	0.0942		0.0433	0.0444		0.0200	pCi/g	10/31/20 10:35	11/24/20 17:31	1
Thorium-232	0.171		0.0832	0.0851		0.100	pCi/g	10/31/20 10:35	11/24/20 17:31	1
Thorium-234	0.591		0.349	0.355		0.257	pCi/g	10/31/20 10:35	11/24/20 17:31	1
Thorium 228	0.248		0.0619	0.0697		0.0307	pCi/g	10/31/20 10:35	11/24/20 17:31	1
Uranium-235	0.104	U	0.223	0.223		0.172	pCi/g	10/31/20 10:35	11/24/20 17:31	1
Uranium-238	0.591		0.349	0.355		0.257	pCi/g	10/31/20 10:35	11/24/20 17:31	1

Client Sample ID: HPPG-SFU-TU153A-011

Lab Sample ID: 160-40004-13

Date Collected: 10/14/20 14:12

Matrix: Solid

Date Received: 10/21/20 09:07

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Total Beta Strontium	0.0790		0.0666	0.0668	0.160	0.0488	pCi/g	11/06/20 11:01	11/26/20 10:43	1
<i>Carrier</i>	<i>%Yield</i>	<i>Qualifier</i>	<i>Limits</i>					<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
<i>Sr Carrier</i>	92.3		40 - 110					11/06/20 11:01	11/26/20 10:43	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.0363	U	0.365	0.365		0.313	pCi/g	10/31/20 10:35	11/24/20 17:32	1
Actinium 228	0.185		0.151	0.152		0.0813	pCi/g	10/31/20 10:35	11/24/20 17:32	1
Bismuth-212	0.242	U	0.560	0.561		0.425	pCi/g	10/31/20 10:35	11/24/20 17:32	1
Bismuth-214	0.331		0.119	0.124		0.0439	pCi/g	10/31/20 10:35	11/24/20 17:32	1
Cesium-137	0.00844	U	0.0547	0.0547	0.0700	0.0437	pCi/g	10/31/20 10:35	11/24/20 17:32	1
Lead-210	-0.0495	U	1.17	1.17		0.829	pCi/g	10/31/20 10:35	11/24/20 17:32	1
Lead-212	0.318		0.0893	0.0983		0.0370	pCi/g	10/31/20 10:35	11/24/20 17:32	1
Lead-214	0.114		0.0916	0.0923		0.0542	pCi/g	10/31/20 10:35	11/24/20 17:32	1
Potassium-40	6.69		1.33	1.49		0.243	pCi/g	10/31/20 10:35	11/24/20 17:32	1
Protactinium-231	0.0000000	U	2.08	2.08		1.71	pCi/g	10/31/20 10:35	11/24/20 17:32	1
	148									
Protactinium-234	-0.0751	U	0.180	0.180		0.155	pCi/g	10/31/20 10:35	11/24/20 17:32	1

Eurofins TestAmerica, St. Louis

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40004-1
 SDG: GJ46599782

Client Sample ID: HPPG-SFU-TU153A-011

Lab Sample ID: 160-40004-13

Date Collected: 10/14/20 14:12

Matrix: Solid

Date Received: 10/21/20 09:07

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Radium-226	0.331		0.119	0.124	0.200	0.0439	pCi/g	10/31/20 10:35	11/24/20 17:32	1
Radium-228	0.185		0.151	0.152		0.0813	pCi/g	10/31/20 10:35	11/24/20 17:32	1
Thallium-208	0.0709		0.0695	0.0699		0.0303	pCi/g	10/31/20 10:35	11/24/20 17:32	1
Thorium-232	0.185		0.151	0.152		0.0813	pCi/g	10/31/20 10:35	11/24/20 17:32	1
Thorium-234	0.268	U	0.435	0.436		0.297	pCi/g	10/31/20 10:35	11/24/20 17:32	1
Thorium 228	0.318		0.0893	0.0983		0.0370	pCi/g	10/31/20 10:35	11/24/20 17:32	1
Uranium-235	0.0701	U	0.214	0.214		0.158	pCi/g	10/31/20 10:35	11/24/20 17:32	1
Uranium-238	0.268	U	0.435	0.436		0.297	pCi/g	10/31/20 10:35	11/24/20 17:32	1

Client Sample ID: HPPG-SFU-TU153A-012

Lab Sample ID: 160-40004-14

Date Collected: 10/14/20 14:18

Matrix: Solid

Date Received: 10/21/20 09:07

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.271	U	0.408	0.409		0.318	pCi/g	10/31/20 10:35	11/24/20 18:56	1
Actinium 228	0.128		0.156	0.156		0.113	pCi/g	10/31/20 10:35	11/24/20 18:56	1
Bismuth-212	-0.458	U	0.871	0.872		0.681	pCi/g	10/31/20 10:35	11/24/20 18:56	1
Bismuth-214	0.271		0.0851	0.0894		0.0247	pCi/g	10/31/20 10:35	11/24/20 18:56	1
Cesium-137	-0.0385	U	0.0474	0.0476	0.0700	0.0498	pCi/g	10/31/20 10:35	11/24/20 18:56	1
Lead-210	-0.619	U	1.49	1.49		1.25	pCi/g	10/31/20 10:35	11/24/20 18:56	1
Lead-212	0.202		0.0617	0.0652		0.0335	pCi/g	10/31/20 10:35	11/24/20 18:56	1
Lead-214	0.276		0.0763	0.0812		0.0289	pCi/g	10/31/20 10:35	11/24/20 18:56	1
Potassium-40	7.01		1.25	1.43		0.188	pCi/g	10/31/20 10:35	11/24/20 18:56	1
Protactinium-231	-0.0000001	U	1.89	1.89		1.56	pCi/g	10/31/20 10:35	11/24/20 18:56	1
	40									
Protactinium-234	0.0605	U	0.188	0.188		0.153	pCi/g	10/31/20 10:35	11/24/20 18:56	1
Radium-226	0.271		0.0851	0.0894	0.200	0.0247	pCi/g	10/31/20 10:35	11/24/20 18:56	1
Radium-228	0.128		0.156	0.156		0.113	pCi/g	10/31/20 10:35	11/24/20 18:56	1
Thallium-208	0.0890		0.0578	0.0585		0.0304	pCi/g	10/31/20 10:35	11/24/20 18:56	1
Thorium-232	0.128		0.156	0.156		0.113	pCi/g	10/31/20 10:35	11/24/20 18:56	1
Thorium-234	0.421		0.396	0.399		0.312	pCi/g	10/31/20 10:35	11/24/20 18:56	1
Thorium 228	0.202		0.0617	0.0652		0.0335	pCi/g	10/31/20 10:35	11/24/20 18:56	1
Uranium-235	-0.149	U	0.262	0.262		0.292	pCi/g	10/31/20 10:35	11/24/20 18:56	1
Uranium-238	0.421		0.396	0.399		0.312	pCi/g	10/31/20 10:35	11/24/20 18:56	1

Client Sample ID: HPPG-SFU-TU153A-013

Lab Sample ID: 160-40004-15

Date Collected: 10/14/20 14:23

Matrix: Solid

Date Received: 10/21/20 09:07

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.0391	U	0.453	0.453		0.280	pCi/g	10/31/20 10:35	11/24/20 19:00	1
Actinium 228	0.368		0.159	0.164		0.0558	pCi/g	10/31/20 10:35	11/24/20 19:00	1
Bismuth-212	-0.340	U	0.642	0.643		0.499	pCi/g	10/31/20 10:35	11/24/20 19:00	1

Eurofins TestAmerica, St. Louis

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40004-1
 SDG: GJ46599782

Client Sample ID: HPPG-SFU-TU153A-013

Lab Sample ID: 160-40004-15

Date Collected: 10/14/20 14:23

Matrix: Solid

Date Received: 10/21/20 09:07

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Bismuth-214	-0.00787	U	0.0212	0.0212		0.140	pCi/g	10/31/20 10:35	11/24/20 19:00	1
Cesium-137	0.0194	U	0.0423	0.0423	0.0700	0.0327	pCi/g	10/31/20 10:35	11/24/20 19:00	1
Lead-210	1.03		1.07	1.08		0.693	pCi/g	10/31/20 10:35	11/24/20 19:00	1
Lead-212	0.208		0.0608	0.0664		0.0318	pCi/g	10/31/20 10:35	11/24/20 19:00	1
Lead-214	0.295		0.0843	0.0897		0.0446	pCi/g	10/31/20 10:35	11/24/20 19:00	1
Potassium-40	7.73		1.15	1.39		0.242	pCi/g	10/31/20 10:35	11/24/20 19:00	1
Protactinium-231	0.000	U	0.224	0.224		1.72	pCi/g	10/31/20 10:35	11/24/20 19:00	1
Protactinium-234	0.0847	U	0.135	0.136		0.114	pCi/g	10/31/20 10:35	11/24/20 19:00	1
Radium-226	-0.00787	U	0.0212	0.0212	0.200	0.140	pCi/g	10/31/20 10:35	11/24/20 19:00	1
Radium-228	0.368		0.159	0.164		0.0558	pCi/g	10/31/20 10:35	11/24/20 19:00	1
Thallium-208	0.0831		0.0463	0.0471		0.0225	pCi/g	10/31/20 10:35	11/24/20 19:00	1
Thorium-232	0.368		0.159	0.164		0.0558	pCi/g	10/31/20 10:35	11/24/20 19:00	1
Thorium-234	0.351		0.380	0.382		0.289	pCi/g	10/31/20 10:35	11/24/20 19:00	1
Thorium 228	0.208		0.0608	0.0664		0.0318	pCi/g	10/31/20 10:35	11/24/20 19:00	1
Uranium-235	0.102	U	0.258	0.259		0.193	pCi/g	10/31/20 10:35	11/24/20 19:00	1
Uranium-238	0.351		0.380	0.382		0.289	pCi/g	10/31/20 10:35	11/24/20 19:00	1

Client Sample ID: HPPG-SFU-TU153A-014

Lab Sample ID: 160-40004-16

Date Collected: 10/14/20 14:28

Matrix: Solid

Date Received: 10/21/20 09:07

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.139	U	0.243	0.243		0.217	pCi/g	10/31/20 10:35	11/24/20 18:55	1
Actinium 228	0.316		0.198	0.201		0.0797	pCi/g	10/31/20 10:35	11/24/20 18:55	1
Bismuth-212	-0.336	U	0.728	0.729		0.562	pCi/g	10/31/20 10:35	11/24/20 18:55	1
Bismuth-214	0.160	U	0.106	0.107		0.181	pCi/g	10/31/20 10:35	11/24/20 18:55	1
Cesium-137	0.00827	U	0.0524	0.0524	0.0700	0.0418	pCi/g	10/31/20 10:35	11/24/20 18:55	1
Lead-210	0.554		0.731	0.733		0.504	pCi/g	10/31/20 10:35	11/24/20 18:55	1
Lead-212	0.217		0.0869	0.0913		0.0420	pCi/g	10/31/20 10:35	11/24/20 18:55	1
Lead-214	0.194		0.117	0.118		0.0796	pCi/g	10/31/20 10:35	11/24/20 18:55	1
Potassium-40	5.27		1.17	1.29		0.238	pCi/g	10/31/20 10:35	11/24/20 18:55	1
Protactinium-231	0.000	U	0.515	0.515		1.72	pCi/g	10/31/20 10:35	11/24/20 18:55	1
Protactinium-234	-0.00735	U	0.0122	0.0122		0.141	pCi/g	10/31/20 10:35	11/24/20 18:55	1
Radium-226	0.160	U	0.106	0.107	0.200	0.181	pCi/g	10/31/20 10:35	11/24/20 18:55	1
Radium-228	0.316		0.198	0.201		0.0797	pCi/g	10/31/20 10:35	11/24/20 18:55	1
Thallium-208	0.0843		0.0602	0.0608		0.0245	pCi/g	10/31/20 10:35	11/24/20 18:55	1
Thorium-232	0.316		0.198	0.201		0.0797	pCi/g	10/31/20 10:35	11/24/20 18:55	1
Thorium-234	0.519		0.393	0.397		0.279	pCi/g	10/31/20 10:35	11/24/20 18:55	1
Thorium 228	0.217		0.0869	0.0913		0.0420	pCi/g	10/31/20 10:35	11/24/20 18:55	1
Uranium-235	0.0861	U	0.228	0.228		0.182	pCi/g	10/31/20 10:35	11/24/20 18:55	1
Uranium-238	0.519		0.393	0.397		0.279	pCi/g	10/31/20 10:35	11/24/20 18:55	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40004-1
 SDG: GJ46599782

Client Sample ID: HPPG-SFU-TU153A-015

Lab Sample ID: 160-40004-17

Date Collected: 10/14/20 14:31

Matrix: Solid

Date Received: 10/21/20 09:07

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.123	U	0.435	0.436		0.254	pCi/g	10/31/20 10:35	11/24/20 18:59	1
Actinium 228	0.231		0.0969	0.0998		0.0335	pCi/g	10/31/20 10:35	11/24/20 18:59	1
Bismuth-212	0.0134	U	0.458	0.458		0.376	pCi/g	10/31/20 10:35	11/24/20 18:59	1
Bismuth-214	0.189		0.0734	0.0760		0.0370	pCi/g	10/31/20 10:35	11/24/20 18:59	1
Cesium-137	0.0205	U	0.0398	0.0399	0.0700	0.0309	pCi/g	10/31/20 10:35	11/24/20 18:59	1
Lead-210	-0.527	U	1.17	1.17		0.937	pCi/g	10/31/20 10:35	11/24/20 18:59	1
Lead-212	0.180		0.0561	0.0608		0.0330	pCi/g	10/31/20 10:35	11/24/20 18:59	1
Lead-214	0.222		0.0816	0.0848		0.0482	pCi/g	10/31/20 10:35	11/24/20 18:59	1
Potassium-40	5.30		0.873	1.03		0.214	pCi/g	10/31/20 10:35	11/24/20 18:59	1
Protactinium-231	0.000	U	0.105	0.105		1.34	pCi/g	10/31/20 10:35	11/24/20 18:59	1
Protactinium-234	0.0339	U	0.0469	0.0470		0.161	pCi/g	10/31/20 10:35	11/24/20 18:59	1
Radium-226	0.189		0.0734	0.0760	0.200	0.0370	pCi/g	10/31/20 10:35	11/24/20 18:59	1
Radium-228	0.231		0.0969	0.0998		0.0335	pCi/g	10/31/20 10:35	11/24/20 18:59	1
Thallium-208	0.0891		0.0383	0.0394		0.0156	pCi/g	10/31/20 10:35	11/24/20 18:59	1
Thorium-232	0.231		0.0969	0.0998		0.0335	pCi/g	10/31/20 10:35	11/24/20 18:59	1
Thorium-234	-0.262	U	0.320	0.321		0.680	pCi/g	10/31/20 10:35	11/24/20 18:59	1
Thorium 228	0.180		0.0561	0.0608		0.0330	pCi/g	10/31/20 10:35	11/24/20 18:59	1
Uranium-235	0.130	U	0.253	0.253		0.263	pCi/g	10/31/20 10:35	11/24/20 18:59	1
Uranium-238	-0.262	U	0.320	0.321		0.680	pCi/g	10/31/20 10:35	11/24/20 18:59	1

Client Sample ID: HPPG-SFU-TU153A-016

Lab Sample ID: 160-40004-18

Date Collected: 10/14/20 14:34

Matrix: Solid

Date Received: 10/21/20 09:07

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.0824	U	0.274	0.274		0.297	pCi/g	10/31/20 10:35	11/24/20 18:59	1
Actinium 228	0.263		0.157	0.160		0.0597	pCi/g	10/31/20 10:35	11/24/20 18:59	1
Bismuth-212	0.402	U	0.801	0.802		0.628	pCi/g	10/31/20 10:35	11/24/20 18:59	1
Bismuth-214	0.262		0.102	0.105		0.0463	pCi/g	10/31/20 10:35	11/24/20 18:59	1
Cesium-137	0.0160	U	0.0329	0.0329	0.0700	0.0245	pCi/g	10/31/20 10:35	11/24/20 18:59	1
Lead-210	0.178	U	0.998	0.999		0.738	pCi/g	10/31/20 10:35	11/24/20 18:59	1
Lead-212	0.257		0.0703	0.0752		0.0370	pCi/g	10/31/20 10:35	11/24/20 18:59	1
Lead-214	0.264		0.0848	0.0889		0.0566	pCi/g	10/31/20 10:35	11/24/20 18:59	1
Potassium-40	7.46		1.15	1.38		0.103	pCi/g	10/31/20 10:35	11/24/20 18:59	1
Protactinium-231	-0.679	U	2.35	2.35		1.91	pCi/g	10/31/20 10:35	11/24/20 18:59	1
Protactinium-234	0.114	U	0.174	0.174		0.195	pCi/g	10/31/20 10:35	11/24/20 18:59	1
Radium-226	0.262		0.102	0.105	0.200	0.0463	pCi/g	10/31/20 10:35	11/24/20 18:59	1
Radium-228	0.263		0.157	0.160		0.0597	pCi/g	10/31/20 10:35	11/24/20 18:59	1
Thallium-208	0.0862		0.0463	0.0472		0.0195	pCi/g	10/31/20 10:35	11/24/20 18:59	1
Thorium-232	0.263		0.157	0.160		0.0597	pCi/g	10/31/20 10:35	11/24/20 18:59	1
Thorium-234	0.154	U	0.494	0.494		0.332	pCi/g	10/31/20 10:35	11/24/20 18:59	1
Thorium 228	0.257		0.0703	0.0752		0.0370	pCi/g	10/31/20 10:35	11/24/20 18:59	1
Uranium-235	0.195	U	0.167	0.168		0.342	pCi/g	10/31/20 10:35	11/24/20 18:59	1
Uranium-238	0.154	U	0.494	0.494		0.332	pCi/g	10/31/20 10:35	11/24/20 18:59	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40004-1
 SDG: GJ46599782

Client Sample ID: HPPG-SFU-TU153A-017

Lab Sample ID: 160-40004-19

Date Collected: 10/14/20 14:37

Matrix: Solid

Date Received: 10/21/20 09:07

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.0664	U	0.334	0.334		0.196	pCi/g	10/31/20 10:35	11/24/20 19:02	1
Actinium 228	0.0905	U	0.174	0.175		0.112	pCi/g	10/31/20 10:35	11/24/20 19:02	1
Bismuth-212	0.0720	U	0.493	0.493		0.400	pCi/g	10/31/20 10:35	11/24/20 19:02	1
Bismuth-214	0.216		0.0683	0.0719		0.0296	pCi/g	10/31/20 10:35	11/24/20 19:02	1
Cesium-137	-0.0333	U	0.0502	0.0503	0.0700	0.0389	pCi/g	10/31/20 10:35	11/24/20 19:02	1
Lead-210	0.429	U	0.799	0.801		0.631	pCi/g	10/31/20 10:35	11/24/20 19:02	1
Lead-212	0.241		0.0533	0.0617		0.0244	pCi/g	10/31/20 10:35	11/24/20 19:02	1
Lead-214	0.232		0.0624	0.0669		0.0294	pCi/g	10/31/20 10:35	11/24/20 19:02	1
Potassium-40	6.29		0.897	1.10		0.0744	pCi/g	10/31/20 10:35	11/24/20 19:02	1
Protactinium-231	0.000	U	0.410	0.410		1.28	pCi/g	10/31/20 10:35	11/24/20 19:02	1
Protactinium-234	0.0580	U	0.148	0.148		0.120	pCi/g	10/31/20 10:35	11/24/20 19:02	1
Radium-226	0.216		0.0683	0.0719	0.200	0.0296	pCi/g	10/31/20 10:35	11/24/20 19:02	1
Radium-228	0.0905	U	0.174	0.175		0.112	pCi/g	10/31/20 10:35	11/24/20 19:02	1
Thallium-208	0.0859		0.0340	0.0352		0.0116	pCi/g	10/31/20 10:35	11/24/20 19:02	1
Thorium-232	0.0905	U	0.174	0.175		0.112	pCi/g	10/31/20 10:35	11/24/20 19:02	1
Thorium-234	0.213	U	0.501	0.501		0.608	pCi/g	10/31/20 10:35	11/24/20 19:02	1
Thorium 228	0.241		0.0533	0.0617		0.0244	pCi/g	10/31/20 10:35	11/24/20 19:02	1
Uranium-235	0.0896	U	0.298	0.298		0.242	pCi/g	10/31/20 10:35	11/24/20 19:02	1
Uranium-238	0.213	U	0.501	0.501		0.608	pCi/g	10/31/20 10:35	11/24/20 19:02	1

Client Sample ID: HPPG-SFU-TU153A-018

Lab Sample ID: 160-40004-20

Date Collected: 10/14/20 14:40

Matrix: Solid

Date Received: 10/21/20 09:07

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.132	U	0.417	0.417		0.327	pCi/g	10/31/20 10:35	11/24/20 19:03	1
Actinium 228	0.205		0.232	0.233		0.120	pCi/g	10/31/20 10:35	11/24/20 19:03	1
Bismuth-212	0.000	U	0.504	0.504		0.547	pCi/g	10/31/20 10:35	11/24/20 19:03	1
Bismuth-214	0.420		0.138	0.147		0.0554	pCi/g	10/31/20 10:35	11/24/20 19:03	1
Cesium-137	0.0446		0.0441	0.0444	0.0700	0.0292	pCi/g	10/31/20 10:35	11/24/20 19:03	1
Lead-210	-1.66	U	1.49	1.50		1.50	pCi/g	10/31/20 10:35	11/24/20 19:03	1
Lead-212	0.210		0.0890	0.0923		0.0581	pCi/g	10/31/20 10:35	11/24/20 19:03	1
Lead-214	0.225		0.131	0.134		0.0916	pCi/g	10/31/20 10:35	11/24/20 19:03	1
Potassium-40	7.50		1.42	1.66		0.373	pCi/g	10/31/20 10:35	11/24/20 19:03	1
Protactinium-231	0.613	U	1.69	1.69		1.65	pCi/g	10/31/20 10:35	11/24/20 19:03	1
Protactinium-234	0.0144	U	0.0257	0.0258		0.273	pCi/g	10/31/20 10:35	11/24/20 19:03	1
Radium-226	0.420		0.138	0.147	0.200	0.0554	pCi/g	10/31/20 10:35	11/24/20 19:03	1
Radium-228	0.205		0.232	0.233		0.120	pCi/g	10/31/20 10:35	11/24/20 19:03	1
Thallium-208	0.00346	U	0.0862	0.0862		0.0501	pCi/g	10/31/20 10:35	11/24/20 19:03	1
Thorium-232	0.205		0.232	0.233		0.120	pCi/g	10/31/20 10:35	11/24/20 19:03	1
Thorium-234	-0.182	U	0.782	0.782		0.649	pCi/g	10/31/20 10:35	11/24/20 19:03	1
Thorium 228	0.210		0.0890	0.0923		0.0581	pCi/g	10/31/20 10:35	11/24/20 19:03	1
Uranium-235	0.0818	U	0.254	0.255		0.486	pCi/g	10/31/20 10:35	11/24/20 19:03	1
Uranium-238	-0.182	U	0.782	0.782		0.649	pCi/g	10/31/20 10:35	11/24/20 19:03	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40004-1
 SDG: GJ46599782

Client Sample ID: HPPG-SFU-TU153A-019

Lab Sample ID: 160-40004-21

Date Collected: 10/14/20 14:42

Matrix: Solid

Date Received: 10/21/20 09:07

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.0403	U	0.0707	0.0708		0.261	pCi/g	10/31/20 12:08	11/23/20 19:50	1
Actinium 228	0.286		0.100	0.104		0.0459	pCi/g	10/31/20 12:08	11/23/20 19:50	1
Bismuth-212	0.0617	U	0.519	0.519		0.422	pCi/g	10/31/20 12:08	11/23/20 19:50	1
Bismuth-214	0.303		0.0835	0.0892		0.0322	pCi/g	10/31/20 12:08	11/23/20 19:50	1
Cesium-137	0.00391	U	0.0313	0.0313	0.0700	0.0253	pCi/g	10/31/20 12:08	11/23/20 19:50	1
Lead-210	-0.165	U	1.08	1.08		0.885	pCi/g	10/31/20 12:08	11/23/20 19:50	1
Lead-212	0.251		0.0585	0.0669		0.0285	pCi/g	10/31/20 12:08	11/23/20 19:50	1
Lead-214	0.269		0.0716	0.0769		0.0423	pCi/g	10/31/20 12:08	11/23/20 19:50	1
Potassium-40	5.56		0.879	1.05		0.0810	pCi/g	10/31/20 12:08	11/23/20 19:50	1
Protactinium-231	-0.595	U	1.89	1.89		1.54	pCi/g	10/31/20 12:08	11/23/20 19:50	1
Protactinium-234	0.0883	U	0.150	0.150		0.144	pCi/g	10/31/20 12:08	11/23/20 19:50	1
Radium-226	0.303		0.0835	0.0892	0.200	0.0322	pCi/g	10/31/20 12:08	11/23/20 19:50	1
Radium-228	0.286		0.100	0.104		0.0459	pCi/g	10/31/20 12:08	11/23/20 19:50	1
Thallium-208	0.0844		0.0612	0.0618		0.0266	pCi/g	10/31/20 12:08	11/23/20 19:50	1
Thorium-232	0.286		0.100	0.104		0.0459	pCi/g	10/31/20 12:08	11/23/20 19:50	1
Thorium-234	-0.273	U	0.789	0.790		0.643	pCi/g	10/31/20 12:08	11/23/20 19:50	1
Thorium 228	0.251		0.0585	0.0669		0.0285	pCi/g	10/31/20 12:08	11/23/20 19:50	1
Uranium-235	-0.0282	U	0.0483	0.0484		0.290	pCi/g	10/31/20 12:08	11/23/20 19:50	1
Uranium-238	-0.273	U	0.789	0.790		0.643	pCi/g	10/31/20 12:08	11/23/20 19:50	1

Client Sample ID: HPPG-SFU-TU153A-020

Lab Sample ID: 160-40004-22

Date Collected: 10/14/20 14:44

Matrix: Solid

Date Received: 10/21/20 09:07

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.201	U	0.550	0.550		0.323	pCi/g	10/31/20 12:08	11/23/20 19:50	1
Actinium 228	0.390		0.162	0.168		0.0611	pCi/g	10/31/20 12:08	11/23/20 19:50	1
Bismuth-212	0.249	U	0.479	0.480		0.351	pCi/g	10/31/20 12:08	11/23/20 19:50	1
Bismuth-214	0.434		0.120	0.130		0.0378	pCi/g	10/31/20 12:08	11/23/20 19:50	1
Cesium-137	-0.0422	U	0.0483	0.0486	0.0700	0.0544	pCi/g	10/31/20 12:08	11/23/20 19:50	1
Lead-210	1.34		1.22	1.23		0.819	pCi/g	10/31/20 12:08	11/23/20 19:50	1
Lead-212	0.355		0.0891	0.0984		0.0440	pCi/g	10/31/20 12:08	11/23/20 19:50	1
Lead-214	0.368		0.139	0.145		0.0636	pCi/g	10/31/20 12:08	11/23/20 19:50	1
Potassium-40	8.34		1.43	1.72		0.280	pCi/g	10/31/20 12:08	11/23/20 19:50	1
Protactinium-231	0.000	U	0.359	0.359		2.68	pCi/g	10/31/20 12:08	11/23/20 19:50	1
Protactinium-234	0.0653	U	0.102	0.102		0.267	pCi/g	10/31/20 12:08	11/23/20 19:50	1
Radium-226	0.434		0.120	0.130	0.200	0.0378	pCi/g	10/31/20 12:08	11/23/20 19:50	1
Radium-228	0.390		0.162	0.168		0.0611	pCi/g	10/31/20 12:08	11/23/20 19:50	1
Thallium-208	0.132		0.0515	0.0537		0.0198	pCi/g	10/31/20 12:08	11/23/20 19:50	1
Thorium-232	0.390		0.162	0.168		0.0611	pCi/g	10/31/20 12:08	11/23/20 19:50	1
Thorium-234	0.831		0.658	0.666		0.446	pCi/g	10/31/20 12:08	11/23/20 19:50	1
Thorium 228	0.355		0.0891	0.0984		0.0440	pCi/g	10/31/20 12:08	11/23/20 19:50	1
Uranium-235	0.199	U	0.205	0.206		0.459	pCi/g	10/31/20 12:08	11/23/20 19:50	1
Uranium-238	0.831		0.658	0.666		0.446	pCi/g	10/31/20 12:08	11/23/20 19:50	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40004-1
 SDG: GJ46599782

Client Sample ID: HPPG-SFU-TU153A-021

Lab Sample ID: 160-40004-23

Date Collected: 10/14/20 14:46

Matrix: Solid

Date Received: 10/21/20 09:07

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Total Beta Strontium	0.0365	U	0.0678	0.0679	0.160	0.0530	pCi/g	11/06/20 11:01	11/26/20 10:43	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	87.1		40 - 110					11/06/20 11:01	11/26/20 10:43	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.190	U	0.383	0.384		0.246	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Actinium 228	0.258		0.221	0.223		0.158	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Bismuth-212	0.0213	U	0.646	0.646		0.530	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Bismuth-214	0.123	U	0.102	0.103		0.150	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Cesium-137	0.0191	U	0.0450	0.0451	0.0700	0.0346	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Lead-210	-1.09	U	0.799	0.809		1.08	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Lead-212	0.263		0.0927	0.0987		0.0427	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Lead-214	0.259		0.0827	0.0870		0.0404	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Potassium-40	6.56		1.20	1.38		0.129	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Protactinium-231	-0.755	U	1.92	1.92		1.55	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Protactinium-234	0.0782	U	0.208	0.208		0.196	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Radium-226	0.123	U	0.102	0.103	0.200	0.150	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Radium-228	0.258		0.221	0.223		0.158	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Thallium-208	0.0919		0.0825	0.0830		0.0353	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Thorium-232	0.258		0.221	0.223		0.158	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Thorium-234	-0.788	U	0.712	0.717		0.876	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Thorium 228	0.263		0.0927	0.0987		0.0427	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Uranium-235	0.0584	U	0.158	0.158		0.340	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Uranium-238	-0.788	U	0.712	0.717		0.876	pCi/g	10/31/20 12:08	11/23/20 21:02	1

Client Sample ID: HPPG-SFU-TU153A-022

Lab Sample ID: 160-40004-24

Date Collected: 10/14/20 14:47

Matrix: Solid

Date Received: 10/21/20 09:07

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.176	U	0.394	0.395		0.226	pCi/g	10/31/20 12:08	11/23/20 21:04	1
Actinium 228	0.252		0.121	0.123		0.0806	pCi/g	10/31/20 12:08	11/23/20 21:04	1
Bismuth-212	-0.178	U	0.492	0.492		0.388	pCi/g	10/31/20 12:08	11/23/20 21:04	1
Bismuth-214	0.314		0.0958	0.101		0.0382	pCi/g	10/31/20 12:08	11/23/20 21:04	1
Cesium-137	0.00533	U	0.0426	0.0426	0.0700	0.0346	pCi/g	10/31/20 12:08	11/23/20 21:04	1
Lead-210	0.502	U	0.962	0.964		0.763	pCi/g	10/31/20 12:08	11/23/20 21:04	1
Lead-212	0.339		0.0635	0.0771		0.0256	pCi/g	10/31/20 12:08	11/23/20 21:04	1
Lead-214	0.299		0.0956	0.101		0.0435	pCi/g	10/31/20 12:08	11/23/20 21:04	1
Potassium-40	6.99		0.993	1.22		0.0822	pCi/g	10/31/20 12:08	11/23/20 21:04	1
Protactinium-231	0.000	U	0.160	0.160		1.61	pCi/g	10/31/20 12:08	11/23/20 21:04	1
Protactinium-234	0.0299	U	0.0497	0.0497		0.187	pCi/g	10/31/20 12:08	11/23/20 21:04	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40004-1
 SDG: GJ46599782

Client Sample ID: HPPG-SFU-TU153A-022

Lab Sample ID: 160-40004-24

Date Collected: 10/14/20 14:47

Matrix: Solid

Date Received: 10/21/20 09:07

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Radium-226	0.314		0.0958	0.101	0.200	0.0382	pCi/g	10/31/20 12:08	11/23/20 21:04	1
Radium-228	0.252		0.121	0.123		0.0806	pCi/g	10/31/20 12:08	11/23/20 21:04	1
Thallium-208	0.105		0.0680	0.0688		0.0291	pCi/g	10/31/20 12:08	11/23/20 21:04	1
Thorium-232	0.252		0.121	0.123		0.0806	pCi/g	10/31/20 12:08	11/23/20 21:04	1
Thorium-234	0.175	U	0.443	0.443		0.762	pCi/g	10/31/20 12:08	11/23/20 21:04	1
Thorium 228	0.339		0.0635	0.0771		0.0256	pCi/g	10/31/20 12:08	11/23/20 21:04	1
Uranium-235	0.000	U	0.0859	0.0859		0.333	pCi/g	10/31/20 12:08	11/23/20 21:04	1
Uranium-238	0.175	U	0.443	0.443		0.762	pCi/g	10/31/20 12:08	11/23/20 21:04	1

Client Sample ID: HPPG-SFU-TU153A-023

Lab Sample ID: 160-40004-25

Date Collected: 10/14/20 14:49

Matrix: Solid

Date Received: 10/21/20 09:07

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.148	U	0.336	0.336		0.280	pCi/g	10/31/20 12:08	11/23/20 21:05	1
Actinium 228	0.308		0.173	0.175		0.0642	pCi/g	10/31/20 12:08	11/23/20 21:05	1
Bismuth-212	0.255	U	0.690	0.690		0.543	pCi/g	10/31/20 12:08	11/23/20 21:05	1
Bismuth-214	0.293		0.118	0.122		0.0579	pCi/g	10/31/20 12:08	11/23/20 21:05	1
Cesium-137	0.0345	U	0.0641	0.0642	0.0700	0.0498	pCi/g	10/31/20 12:08	11/23/20 21:05	1
Lead-210	1.61		1.43	1.44		0.914	pCi/g	10/31/20 12:08	11/23/20 21:05	1
Lead-212	0.339		0.0750	0.0829		0.0317	pCi/g	10/31/20 12:08	11/23/20 21:05	1
Lead-214	0.429		0.105	0.114		0.0387	pCi/g	10/31/20 12:08	11/23/20 21:05	1
Potassium-40	7.45		1.19	1.41		0.111	pCi/g	10/31/20 12:08	11/23/20 21:05	1
Protactinium-231	0.313	U	1.21	1.21		1.89	pCi/g	10/31/20 12:08	11/23/20 21:05	1
Protactinium-234	0.0634	U	0.135	0.136		0.209	pCi/g	10/31/20 12:08	11/23/20 21:05	1
Radium-226	0.293		0.118	0.122	0.200	0.0579	pCi/g	10/31/20 12:08	11/23/20 21:05	1
Radium-228	0.308		0.173	0.175		0.0642	pCi/g	10/31/20 12:08	11/23/20 21:05	1
Thallium-208	0.0478		0.0808	0.0810		0.0469	pCi/g	10/31/20 12:08	11/23/20 21:05	1
Thorium-232	0.308		0.173	0.175		0.0642	pCi/g	10/31/20 12:08	11/23/20 21:05	1
Thorium-234	0.890		0.603	0.611		0.360	pCi/g	10/31/20 12:08	11/23/20 21:05	1
Thorium 228	0.339		0.0750	0.0829		0.0317	pCi/g	10/31/20 12:08	11/23/20 21:05	1
Uranium-235	0.184	U	0.152	0.153		0.325	pCi/g	10/31/20 12:08	11/23/20 21:05	1
Uranium-238	0.890		0.603	0.611		0.360	pCi/g	10/31/20 12:08	11/23/20 21:05	1

Client Sample ID: HPPG-SFU-TU153A-024

Lab Sample ID: 160-40004-26

Date Collected: 10/14/20 14:51

Matrix: Solid

Date Received: 10/21/20 09:07

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.0959	U	0.212	0.212		0.245	pCi/g	10/31/20 12:08	11/23/20 21:06	1
Actinium 228	0.264		0.104	0.108		0.0346	pCi/g	10/31/20 12:08	11/23/20 21:06	1
Bismuth-212	0.153	U	0.329	0.329		0.249	pCi/g	10/31/20 12:08	11/23/20 21:06	1

Client Sample Results

Page 95 of 150

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40004-1
 SDG: GJ46599782

Client Sample ID: HPPG-SFU-TU153A-024

Lab Sample ID: 160-40004-26

Date Collected: 10/14/20 14:51

Matrix: Solid

Date Received: 10/21/20 09:07

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Bismuth-214	0.251		0.0832	0.0872		0.0351	pCi/g	10/31/20 12:08	11/23/20 21:06	1
Cesium-137	-0.0117	U	0.0534	0.0535	0.0700	0.0432	pCi/g	10/31/20 12:08	11/23/20 21:06	1
Lead-210	-0.532	U	1.18	1.18		0.946	pCi/g	10/31/20 12:08	11/23/20 21:06	1
Lead-212	0.209		0.0540	0.0604		0.0270	pCi/g	10/31/20 12:08	11/23/20 21:06	1
Lead-214	0.245		0.0788	0.0828		0.0339	pCi/g	10/31/20 12:08	11/23/20 21:06	1
Potassium-40	5.43		0.898	1.06		0.221	pCi/g	10/31/20 12:08	11/23/20 21:06	1
Protactinium-231	0.731	U	0.472	0.478		1.28	pCi/g	10/31/20 12:08	11/23/20 21:06	1
Protactinium-234	0.0110	U	0.0187	0.0187		0.153	pCi/g	10/31/20 12:08	11/23/20 21:06	1
Radium-226	0.251		0.0832	0.0872	0.200	0.0351	pCi/g	10/31/20 12:08	11/23/20 21:06	1
Radium-228	0.264		0.104	0.108		0.0346	pCi/g	10/31/20 12:08	11/23/20 21:06	1
Thallium-208	0.0435		0.0416	0.0419		0.0192	pCi/g	10/31/20 12:08	11/23/20 21:06	1
Thorium-232	0.264		0.104	0.108		0.0346	pCi/g	10/31/20 12:08	11/23/20 21:06	1
Thorium-234	-0.242	U	0.149	0.151		0.623	pCi/g	10/31/20 12:08	11/23/20 21:06	1
Thorium 228	0.209		0.0540	0.0604		0.0270	pCi/g	10/31/20 12:08	11/23/20 21:06	1
Uranium-235	0.000	U	0.143	0.143		0.264	pCi/g	10/31/20 12:08	11/23/20 21:06	1
Uranium-238	-0.242	U	0.149	0.151		0.623	pCi/g	10/31/20 12:08	11/23/20 21:06	1

Client Sample ID: HPPG-SFU-TU153A-025

Lab Sample ID: 160-40004-27

Date Collected: 10/14/20 14:53

Matrix: Solid

Date Received: 10/21/20 09:07

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.0647	U	0.262	0.262		0.323	pCi/g	10/31/20 12:08	11/23/20 21:03	1
Actinium 228	0.368		0.249	0.252		0.111	pCi/g	10/31/20 12:08	11/23/20 21:03	1
Bismuth-212	0.000	U	0.334	0.334		0.503	pCi/g	10/31/20 12:08	11/23/20 21:03	1
Bismuth-214	0.345		0.132	0.137		0.0508	pCi/g	10/31/20 12:08	11/23/20 21:03	1
Cesium-137	-0.0313	U	0.0616	0.0617	0.0700	0.0742	pCi/g	10/31/20 12:08	11/23/20 21:03	1
Lead-210	-0.455	U	1.31	1.31		0.941	pCi/g	10/31/20 12:08	11/23/20 21:03	1
Lead-212	0.325		0.0775	0.0882		0.0336	pCi/g	10/31/20 12:08	11/23/20 21:03	1
Lead-214	0.346		0.0918	0.0986		0.0454	pCi/g	10/31/20 12:08	11/23/20 21:03	1
Potassium-40	6.58		1.31	1.47		0.239	pCi/g	10/31/20 12:08	11/23/20 21:03	1
Protactinium-231	0.000	U	0.345	0.345		1.79	pCi/g	10/31/20 12:08	11/23/20 21:03	1
Protactinium-234	0.0704	U	0.167	0.167		0.116	pCi/g	10/31/20 12:08	11/23/20 21:03	1
Radium-226	0.345		0.132	0.137	0.200	0.0508	pCi/g	10/31/20 12:08	11/23/20 21:03	1
Radium-228	0.368		0.249	0.252		0.111	pCi/g	10/31/20 12:08	11/23/20 21:03	1
Thallium-208	0.157		0.0486	0.0512		0.00835	pCi/g	10/31/20 12:08	11/23/20 21:03	1
Thorium-232	0.368		0.249	0.252		0.111	pCi/g	10/31/20 12:08	11/23/20 21:03	1
Thorium-234	-0.343	U	0.709	0.710		0.653	pCi/g	10/31/20 12:08	11/23/20 21:03	1
Thorium 228	0.325		0.0775	0.0882		0.0336	pCi/g	10/31/20 12:08	11/23/20 21:03	1
Uranium-235	0.0858	U	0.182	0.182		0.259	pCi/g	10/31/20 12:08	11/23/20 21:03	1
Uranium-238	-0.343	U	0.709	0.710		0.653	pCi/g	10/31/20 12:08	11/23/20 21:03	1

Eurofins TestAmerica, St. Louis

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40004-1
 SDG: GJ46599782

Method: 905.0 - Total Beta Strontium (GFPC)

Lab Sample ID: MB 160-488460/24-A
Matrix: Solid
Analysis Batch: 490292

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 488460

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Total Beta Strontium	-0.01989	U	0.0586	0.0586	0.160	0.0499	pCi/g	11/06/20 11:01	11/26/20 10:48	1
Carrier	%Yield	MB Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	86.4		40 - 110					11/06/20 11:01	11/26/20 10:48	1

Lab Sample ID: LCS 160-488460/1-A
Matrix: Solid
Analysis Batch: 490302

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 488460

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits
				Uncert. (2σ+/-)					
Total Beta Strontium	7.77	6.487		0.537	0.160	0.0549	pCi/g	83	75 - 125
Carrier	%Yield	LCS Qualifier	Limits						
Sr Carrier	89.5		40 - 110						

Lab Sample ID: 160-40004-3 DU
Matrix: Solid
Analysis Batch: 490302

Client Sample ID: HPPG-SFU-TU153A-001
Prep Type: Total/NA
Prep Batch: 488460

Analyte	Sample	Sample	DU	DU	Total	LOQ	DLC	Unit	RER	RER Limit
	Result	Qual	Result	Qual	Uncert. (2σ+/-)					
Total Beta Strontium	-0.0609	U	-0.09624	U	0.0563	0.160	0.0536	pCi/g	0.31	1
Carrier	%Yield	DU Qualifier	Limits							
Sr Carrier	90.6		40 - 110							

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-487562/1-A
Matrix: Solid
Analysis Batch: 490077

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 487562

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium-227	0.07170	U	0.181	0.181		0.251	pCi/g	10/31/20 10:35	11/24/20 14:28	1
Actinium 228	0.007012	U	0.194	0.194		0.106	pCi/g	10/31/20 10:35	11/24/20 14:28	1
Bismuth-212	-0.4221	U	0.894	0.895		0.683	pCi/g	10/31/20 10:35	11/24/20 14:28	1
Bismuth-214	-0.001610	U	0.160	0.160		0.131	pCi/g	10/31/20 10:35	11/24/20 14:28	1
Cesium-137	-0.01127	U	0.0403	0.0403	0.0700	0.0785	pCi/g	10/31/20 10:35	11/24/20 14:28	1
Lead-210	1.121		1.36	1.37		0.942	pCi/g	10/31/20 10:35	11/24/20 14:28	1
Lead-212	0.002238	U	0.0891	0.0891		0.0728	pCi/g	10/31/20 10:35	11/24/20 14:28	1
Lead-214	-0.04706	U	0.101	0.101		0.0886	pCi/g	10/31/20 10:35	11/24/20 14:28	1
Potassium-40	-0.1967	U	0.586	0.586		0.304	pCi/g	10/31/20 10:35	11/24/20 14:28	1
Protactinium-231	-0.8697	U	3.38	3.38		2.75	pCi/g	10/31/20 10:35	11/24/20 14:28	1

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40004-1
 SDG: GJ46599782

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: MB 160-487562/1-A
Matrix: Solid
Analysis Batch: 490077

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 487562

Analyte	MB MB		Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared		Analyzed		Dil Fac
	Result	Qualifier										
Protactinium-234	0.07099	U	0.136	0.136		0.166	pCi/g	10/31/20 10:35	11/24/20 14:28			1
Radium-226	-0.001610	U	0.160	0.160	0.200	0.131	pCi/g	10/31/20 10:35	11/24/20 14:28			1
Radium-228	0.007012	U	0.194	0.194		0.106	pCi/g	10/31/20 10:35	11/24/20 14:28			1
Thallium-208	0.01612	U	0.0667	0.0668		0.0358	pCi/g	10/31/20 10:35	11/24/20 14:28			1
Thorium-232	0.007012	U	0.194	0.194		0.106	pCi/g	10/31/20 10:35	11/24/20 14:28			1
Thorium-234	0.2869	U	0.444	0.445		0.357	pCi/g	10/31/20 10:35	11/24/20 14:28			1
Thorium 228	0.002238	U	0.0891	0.0891		0.0728	pCi/g	10/31/20 10:35	11/24/20 14:28			1
Uranium-235	0.03670	U	0.0874	0.0875		0.302	pCi/g	10/31/20 10:35	11/24/20 14:28			1
Uranium-238	0.2869	U	0.444	0.445		0.357	pCi/g	10/31/20 10:35	11/24/20 14:28			1

Lab Sample ID: LCS 160-487562/2-A
Matrix: Solid
Analysis Batch: 490258

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 487562

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec. Limits	
Americium-241	96.4	94.66		9.93		0.486	pCi/g	98	87 - 116	
Cesium-137	26.8	25.86		2.75	0.0700	0.0593	pCi/g	97	87 - 120	
Cobalt-60	9.53	9.080		0.954		0.0258	pCi/g	95	87 - 115	

Lab Sample ID: 160-40004-20 DU
Matrix: Solid
Analysis Batch: 490083

Client Sample ID: HPPG-SFU-TU153A-018
Prep Type: Total/NA
Prep Batch: 487562

Analyte	Sample Sample		DU DU		Total Uncert. (2σ+/-)	LOQ	DLC	Unit	RER	RER Limit
	Result	Qual	Result	Qual						
Actinium-227	0.132	U	0.1682	U	0.236		0.333	pCi/g	0.06	1
Actinium 228	0.205		0.1471		0.197		0.105	pCi/g	0.13	1
Bismuth-212	0.000	U	0.0000	U	0.329		0.355	pCi/g	0	1
Bismuth-214	0.420		0.1250		0.104		0.0936	pCi/g	1.18	1
Cesium-137	0.0446		-0.02152	U	0.0558	0.0700	0.0436	pCi/g	0.66	1
Lead-210	-1.66	U	-1.296	U	0.712		1.42	pCi/g	0.16	1
Lead-212	0.210		0.03833	U	0.136		0.110	pCi/g	0.75	1
Lead-214	0.225		0.3341		0.0911		0.0447	pCi/g	0.48	1
Potassium-40	7.50		6.948		1.45		0.133	pCi/g	0.18	1
Protactinium-231	0.613	U	0.0000	U	0.161		1.85	pCi/g	0.33	1
Protactinium-234	0.0144	U	0.1594	U	0.233		0.200	pCi/g	0.56	1
Radium-226	0.420		0.1250		0.104	0.200	0.0936	pCi/g	1.18	1
Radium-228	0.205		0.1471		0.197		0.105	pCi/g	0.13	1
Thallium-208	0.00346	U	0.05282		0.101		0.0491	pCi/g	0.26	1
Thorium-232	0.205		0.1471		0.197		0.105	pCi/g	0.13	1
Thorium-234	-0.182	U	-0.8712	U	0.816		1.08	pCi/g	0.43	1
Thorium 228	0.210		0.03833	U	0.136		0.110	pCi/g	0.75	1
Uranium-235	0.0818	U	-0.01887	U	0.431		0.367	pCi/g	0.15	1
Uranium-238	-0.182	U	-0.8712	U	0.816		1.08	pCi/g	0.43	1

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40004-1
 SDG: GJ46599782

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: MB 160-487563/1-A
Matrix: Solid
Analysis Batch: 489963

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 487563

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium-227	0.03654	U	0.0895	0.0897		0.311	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Actinium 228	-0.02197	U	0.0434	0.0435		0.137	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Bismuth-212	-0.5732	U	0.947	0.949		0.728	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Bismuth-214	0.005591	U	0.00730	0.00733		0.152	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Cesium-137	-0.04570	U	0.0814	0.0816	0.0700	0.0631	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Lead-210	0.5695	U	1.56	1.57		1.02	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Lead-212	-0.007227	U	0.0816	0.0816		0.0674	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Lead-214	-0.09487	U	0.123	0.123		0.110	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Potassium-40	-0.2454	U	0.750	0.750		0.494	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Protactinium-231	0.0000	U	0.748	0.748		2.54	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Protactinium-234	-0.08399	U	0.269	0.269		0.218	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Radium-226	0.005591	U	0.00730	0.00733	0.200	0.152	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Radium-228	-0.02197	U	0.0434	0.0435		0.137	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Thallium-208	-0.03789	U	0.0628	0.0629		0.0456	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Thorium-232	-0.02197	U	0.0434	0.0435		0.137	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Thorium-234	-1.207	U	0.802	0.813		0.802	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Thorium 228	-0.007227	U	0.0816	0.0816		0.0674	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Uranium-235	0.1218	U	0.395	0.395		0.319	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Uranium-238	-1.207	U	0.802	0.813		0.802	pCi/g	10/31/20 12:08	11/23/20 21:02	1

Lab Sample ID: LCS 160-487563/2-A
Matrix: Solid
Analysis Batch: 489982

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 487563

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec.
				Uncert. (2σ+/-)					Limits
Americium-241	96.4	97.02		10.2		0.616	pCi/g	101	87 - 116
Cesium-137	26.8	27.03		2.92	0.0700	0.116	pCi/g	101	87 - 120
Cobalt-60	9.53	9.349		1.01		0.0186	pCi/g	98	87 - 115

QC Association Summary

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40004-1
 SDG: GJ46599782

Rad

Leach Batch: 486846

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40004-1	HPPG-F-011	Total/NA	Solid	Dry and Grind	
160-40004-2	HPPG-F-012	Total/NA	Solid	Dry and Grind	
160-40004-3	HPPG-SFU-TU153A-001	Total/NA	Solid	Dry and Grind	
160-40004-4	HPPG-SFU-TU153A-002	Total/NA	Solid	Dry and Grind	
160-40004-5	HPPG-SFU-TU153A-003	Total/NA	Solid	Dry and Grind	
160-40004-6	HPPG-SFU-TU153A-004	Total/NA	Solid	Dry and Grind	
160-40004-7	HPPG-SFU-TU153A-005	Total/NA	Solid	Dry and Grind	
160-40004-8	HPPG-SFU-TU153A-006	Total/NA	Solid	Dry and Grind	
160-40004-9	HPPG-SFU-TU153A-007	Total/NA	Solid	Dry and Grind	
160-40004-10	HPPG-SFU-TU153A-008	Total/NA	Solid	Dry and Grind	
160-40004-11	HPPG-SFU-TU153A-009	Total/NA	Solid	Dry and Grind	
160-40004-12	HPPG-SFU-TU153A-010	Total/NA	Solid	Dry and Grind	
160-40004-13	HPPG-SFU-TU153A-011	Total/NA	Solid	Dry and Grind	
160-40004-14	HPPG-SFU-TU153A-012	Total/NA	Solid	Dry and Grind	
160-40004-15	HPPG-SFU-TU153A-013	Total/NA	Solid	Dry and Grind	
160-40004-16	HPPG-SFU-TU153A-014	Total/NA	Solid	Dry and Grind	
160-40004-17	HPPG-SFU-TU153A-015	Total/NA	Solid	Dry and Grind	
160-40004-18	HPPG-SFU-TU153A-016	Total/NA	Solid	Dry and Grind	
160-40004-19	HPPG-SFU-TU153A-017	Total/NA	Solid	Dry and Grind	
160-40004-20	HPPG-SFU-TU153A-018	Total/NA	Solid	Dry and Grind	
160-40004-21	HPPG-SFU-TU153A-019	Total/NA	Solid	Dry and Grind	
160-40004-22	HPPG-SFU-TU153A-020	Total/NA	Solid	Dry and Grind	
160-40004-23	HPPG-SFU-TU153A-021	Total/NA	Solid	Dry and Grind	
160-40004-24	HPPG-SFU-TU153A-022	Total/NA	Solid	Dry and Grind	
160-40004-3 DU	HPPG-SFU-TU153A-001	Total/NA	Solid	Dry and Grind	
160-40004-20 DU	HPPG-SFU-TU153A-018	Total/NA	Solid	Dry and Grind	

Leach Batch: 486856

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40004-25	HPPG-SFU-TU153A-023	Total/NA	Solid	Dry and Grind	
160-40004-26	HPPG-SFU-TU153A-024	Total/NA	Solid	Dry and Grind	
160-40004-27	HPPG-SFU-TU153A-025	Total/NA	Solid	Dry and Grind	

Prep Batch: 487562

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40004-1	HPPG-F-011	Total/NA	Solid	Fill_Geo-21	486846
160-40004-2	HPPG-F-012	Total/NA	Solid	Fill_Geo-21	486846
160-40004-3	HPPG-SFU-TU153A-001	Total/NA	Solid	Fill_Geo-21	486846
160-40004-4	HPPG-SFU-TU153A-002	Total/NA	Solid	Fill_Geo-21	486846
160-40004-5	HPPG-SFU-TU153A-003	Total/NA	Solid	Fill_Geo-21	486846
160-40004-6	HPPG-SFU-TU153A-004	Total/NA	Solid	Fill_Geo-21	486846
160-40004-7	HPPG-SFU-TU153A-005	Total/NA	Solid	Fill_Geo-21	486846
160-40004-8	HPPG-SFU-TU153A-006	Total/NA	Solid	Fill_Geo-21	486846
160-40004-9	HPPG-SFU-TU153A-007	Total/NA	Solid	Fill_Geo-21	486846
160-40004-10	HPPG-SFU-TU153A-008	Total/NA	Solid	Fill_Geo-21	486846
160-40004-11	HPPG-SFU-TU153A-009	Total/NA	Solid	Fill_Geo-21	486846
160-40004-12	HPPG-SFU-TU153A-010	Total/NA	Solid	Fill_Geo-21	486846
160-40004-13	HPPG-SFU-TU153A-011	Total/NA	Solid	Fill_Geo-21	486846
160-40004-14	HPPG-SFU-TU153A-012	Total/NA	Solid	Fill_Geo-21	486846
160-40004-15	HPPG-SFU-TU153A-013	Total/NA	Solid	Fill_Geo-21	486846
160-40004-16	HPPG-SFU-TU153A-014	Total/NA	Solid	Fill_Geo-21	486846

QC Association Summary

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40004-1
 SDG: GJ46599782

Rad (Continued)

Prep Batch: 487562 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40004-17	HPPG-SFU-TU153A-015	Total/NA	Solid	Fill_Geo-21	486846
160-40004-18	HPPG-SFU-TU153A-016	Total/NA	Solid	Fill_Geo-21	486846
160-40004-19	HPPG-SFU-TU153A-017	Total/NA	Solid	Fill_Geo-21	486846
160-40004-20	HPPG-SFU-TU153A-018	Total/NA	Solid	Fill_Geo-21	486846
MB 160-487562/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-487562/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-40004-20 DU	HPPG-SFU-TU153A-018	Total/NA	Solid	Fill_Geo-21	486846

Prep Batch: 487563

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40004-21	HPPG-SFU-TU153A-019	Total/NA	Solid	Fill_Geo-21	486846
160-40004-22	HPPG-SFU-TU153A-020	Total/NA	Solid	Fill_Geo-21	486846
160-40004-23	HPPG-SFU-TU153A-021	Total/NA	Solid	Fill_Geo-21	486846
160-40004-24	HPPG-SFU-TU153A-022	Total/NA	Solid	Fill_Geo-21	486846
160-40004-25	HPPG-SFU-TU153A-023	Total/NA	Solid	Fill_Geo-21	486856
160-40004-26	HPPG-SFU-TU153A-024	Total/NA	Solid	Fill_Geo-21	486856
160-40004-27	HPPG-SFU-TU153A-025	Total/NA	Solid	Fill_Geo-21	486856
MB 160-487563/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-487563/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	

Prep Batch: 488460

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40004-3	HPPG-SFU-TU153A-001	Total/NA	Solid	DPS-0	486846
160-40004-13	HPPG-SFU-TU153A-011	Total/NA	Solid	DPS-0	486846
160-40004-23	HPPG-SFU-TU153A-021	Total/NA	Solid	DPS-0	486846
MB 160-488460/24-A	Method Blank	Total/NA	Solid	DPS-0	
LCS 160-488460/1-A	Lab Control Sample	Total/NA	Solid	DPS-0	
160-40004-3 DU	HPPG-SFU-TU153A-001	Total/NA	Solid	DPS-0	486846

Tracer/Carrier Summary

Page 101 of 150

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40004-1
SDG: GJ46599782

Method: 905.0 - Total Beta Strontium (GFPC)

Matrix: Solid

Prep Type: Total/NA

Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	Sr (40-110)
160-40004-3	HPPG-SFU-TU153A-001	89.8
160-40004-3 DU	HPPG-SFU-TU153A-001	90.6
160-40004-13	HPPG-SFU-TU153A-011	92.3
160-40004-23	HPPG-SFU-TU153A-021	87.1
LCS 160-488460/1-A	Lab Control Sample	89.5
MB 160-488460/24-A	Method Blank	86.4

Tracer/Carrier Legend

Sr = Sr Carrier



Environment Testing America

ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

Laboratory Job ID: 160-40004-2
Laboratory Sample Delivery Group: GJ46599782
Client Project/Site: HPNS-Parcel G 501197

For:

Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
Concord, California 94520

Attn: Rose Condit

Rhonda Ridenhower

Authorized for release by:
12/31/2020 2:24:17 PM

Rhonda Ridenhower, Client Service Manager
(314)298-8566
Rhonda.Ridenhower@Eurofinset.com

LINKS

Review your project
results through
TotalAccess

Have a Question?



Visit us at:

www.eurofinsus.com/Env

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

1

2

3

4

5

6

7

8

9

10

11

12



Table of Contents

Cover Page	1
Table of Contents	2
Case Narrative	3
Chain of Custody	5
Receipt Checklists	9
Definitions/Glossary	10
Method Summary	11
Sample Summary	12
Client Sample Results	13
QC Sample Results	15
QC Association Summary	16
Tracer Carrier Summary	17

Case Narrative

Page 104 of 150

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40004-2
SDG: GJ46599782

Job ID: 160-40004-2

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: HPNS-Parcel G 501197

Report Number: 160-40004-2

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

RECEIPT

The samples were received on 10/21/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at

Case Narrative

Page 105 of 150

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40004-2
SDG: GJ46599782

Job ID: 160-40004-2 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

receipt was 17.6 C.

Additional analysis requested by the client and not listed on the COC.

ISOTOPIC PLUTONIUM (ALPHA SPECTROMETRY)

Samples HPPG-SFU-TU153A-001 (160-40004-3), HPPG-SFU-TU153A-011 (160-40004-13) and HPPG-SFU-TU153A-021 (160-40004-23) were analyzed for Isotopic Plutonium (Alpha Spectrometry) in accordance with A-01-R. The samples were leached on 10/26/2020, prepared on 12/08/2020 and analyzed on 12/29/2020.

The method blank (MB) Z-score is within limits and is located in the level IV raw data. (MB 160-491191/1-A)

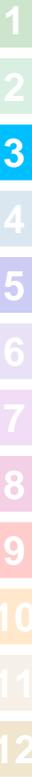
No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC URANIUM (ALPHA SPECTROMETRY)

Samples HPPG-SFU-TU153A-001 (160-40004-3), HPPG-SFU-TU153A-011 (160-40004-13) and HPPG-SFU-TU153A-021 (160-40004-23) were analyzed for Isotopic Uranium (Alpha Spectrometry) in accordance with DOE. The samples were leached on 10/26/2020, prepared on 12/08/2020 and analyzed on 12/29/2020.

The method blank (MB) Z-score is within limits and is located in the level IV raw data. (MB 160-491192/1-A)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.





APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy

Sample Lead: Lewis, Devin

Sample Tech(s):

CHAIN OF CUSTODY

Ref. Document # 501197RSY-010

Project Number: 501197
Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action
Project Location: San Francisco, CA
Purchase Order #: 1159058
Shipment/Pickup Date: 10/20/2020
Waybill Number: 4957 0225 2278
Lab Destination: Test America (St. Louis Lab)
13715 Rider Trail North
Earth City, MO 63046

Lab Contact Name/ph # Rhoeda Ridenbower (314)298-8566

							Analysis Requested							
Sample ID	Date	Time	Method	Matrix	# of Containers	Container Type	Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Total Strontium (EPA 905 MOD)	Strontium-90 (EPA 905 MOD)			Dose Rate uR/Hr	Evidence Bag ID	Comment
HPPG-F-011	10/14/2020	13:22	G	SO	1	16 oz. plastic jar	X					4	GJ46599782	
HPPG-F-012	10/14/2020	14:37	G	SO	1	16 oz. plastic jar	X					4	GJ46599782	
HPPG-SFU-TU153A-001	10/14/2020	12:48	G	SO	1	16 oz. plastic jar	X	X	X			4	GJ46599782	
HPPG-SFU-TU153A-002	10/14/2020	12:53	G	SO	1	16 oz. plastic jar	X					4	GJ46599782	
HPPG-SFU-TU153A-003	10/14/2020	12:57	G	SO	1	16 oz. plastic jar	X					4	GJ46599782	
HPPG-SFU-TU153A-004	10/14/2020	13:02	G	SO	1	16 oz. plastic jar	X					4	GJ46599782	
HPPG-SFU-TU153A-005	10/14/2020	13:06	G	SO	1	16 oz. plastic jar	X					4	GJ46599782	
HPPG-SFU-TU153A-006	10/14/2020	13:10	G	SO	1	16 oz. plastic jar	X					4	GJ46599782	



Special Instructions: 21 day ingrowth results only
 Analyze for Total Strontium as a screening step, and isotopic Sr-90 only if Total Strontium is above project action limit of 0.331 pCi/g

Turanaround Time: 3-day 10-Day 28-day Other **Level of QC Required:** I II III Project Specific

Method Codes C = Composite G = Grab **Matrix Codes:** DW = Drinking Water; So = Soil; GW = Ground Water; SL = Sludge; WW = Waste Water; CP = Chip Samples; A = Air; ABS = Asbestos; PO = Pipe Opening

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		10/15/2020 17:00	Locked Storage (RKillpack)		10/15/2020 17:00
Locked Storage (RKillpack)		10/20/2020 13:30	Devin Lewis		10/20/2020 13:30
Devin Lewis		10/20/2020 14:41	SHIPPEDTOLAB		10/21/2020 0907

*** Last 3 transfers shown above - Complete list of transfers on last page ***





APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy
City: Concord, CA 94520

Sample Lead: Lewis, Devin

Sample Tech(s):

CHAIN OF CUSTODY

Ref. Document # 501197RSY-010

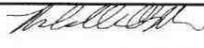
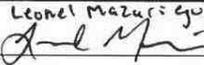
Project Number: 501197
Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action
Project Location: San Francisco, CA
Purchase Order #: 1159058
Shipment/Pickup Date: 10/20/2020
Waybill Number: 4957 0225 2278
Lab Destination: Test America (St. Louis Lab)
13715 Rider Trail North
Earth City, MO 63046

Lab Contact Name/ph # Rhoeda Ridenbower (314)298-8566

Sample ID	Collection Information			Matrix	# of Containers	Analysis Requested							Dose Rate uR/Hr	Evidence Bag ID	Comment
	Date	Time	Method			Container Type	Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Total Strontium (EPA 905 MOD)	Strontium-90 (EPA 905 MOD)						
HPPG-SFU-TU153A-007	10/14/2020	13:14	G	SO	1	16 oz. plastic jar	X						4	GJ46599782	
HPPG-SFU-TU153A-008	10/14/2020	13:22	G	SO	1	16 oz. plastic jar	X						4	GJ46599782	
HPPG-SFU-TU153A-009	10/14/2020	14:02	G	SO	1	16 oz. plastic jar	X						4	GJ46599782	
HPPG-SFU-TU153A-010	10/14/2020	14:07	G	SO	1	16 oz. plastic jar	X						4	GJ46599782	
HPPG-SFU-TU153A-011	10/14/2020	14:12	G	SO	1	16 oz. plastic jar	X	X	X				4	GJ46599782	
HPPG-SFU-TU153A-012	10/14/2020	14:18	G	SO	1	16 oz. plastic jar	X						4	GJ46599782	
HPPG-SFU-TU153A-013	10/14/2020	14:23	G	SO	1	16 oz. plastic jar	X						4	GJ46599782	
HPPG-SFU-TU153A-014	10/14/2020	14:28	G	SO	1	16 oz. plastic jar	X						4	GJ46599782	
HPPG-SFU-TU153A-015	10/14/2020	14:31	G	SO	1	16 oz. plastic jar	X						4	GJ46599782	
HPPG-SFU-TU153A-016	10/14/2020	14:34	G	SO	1	16 oz. plastic jar	X						4	GJ46599782	
HPPG-SFU-TU153A-017	10/14/2020	14:37	G	SO	1	16 oz. plastic jar	X						4	GJ46599782	
HPPG-SFU-TU153A-018	10/14/2020	14:40	G	SO	1	16 oz. plastic jar	X						4	GJ46599782	
HPPG-SFU-TU153A-019	10/14/2020	14:42	G	SO	1	16 oz. plastic jar	X						4	GJ46599782	
HPPG-SFU-TU153A-020	10/14/2020	14:44	G	SO	1	16 oz. plastic jar	X						4	GJ46599782	
HPPG-SFU-TU153A-021	10/14/2020	14:46	G	SO	1	16 oz. plastic jar	X	X	X				4	GJ46599782	
HPPG-SFU-TU153A-022	10/14/2020	14:47	G	SO	1	16 oz. plastic jar	X						4	GJ46599782	
HPPG-SFU-TU153A-023	10/14/2020	14:49	G	SO	1	16 oz. plastic jar	X						4	GJ46599782	



All Transfers for COC 501197RSY-010

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		10/14/2020 15:56	Locked Storage (RKillpack)		10/14/2020 15:56
Locked Storage (RKillpack)		10/15/2020 14:47	Devin Lewis		10/15/2020 14:47
Lewis, Devin		10/15/2020 17:00	Locked Storage (RKillpack)		10/15/2020 17:00
Locked Storage (RKillpack)		10/20/2020 13:30	Devin Lewis		10/20/2020 13:30
Devin Lewis		10/20/2020 14:41	SHIPPEDTOLAB	Leonel Mazurcigus 	10/21/2020 09:02



Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-40004-2

SDG Number: GJ46599782

Login Number: 40004**List Source: Eurofins TestAmerica, St. Louis****List Number: 1****Creator: Korrinhizer, Micha L**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40004-2
SDG: GJ46599782

Qualifiers

Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Method Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40004-2
SDG: GJ46599782

Method	Method Description	Protocol	Laboratory
A-01-R	Isotopic Plutonium and Neptunium (Alpha Spectrometry)	DOE	TAL SL
A-01-R	Isotopic Uranium (Alpha Spectrometry)	DOE	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
ExtChrom	Preparation, Extraction Chromatography Resin Actinide Separation	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy
None = None

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566



Sample Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40004-2
SDG: GJ46599782

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-40004-3	HPPG-SFU-TU153A-001	Solid	10/14/20 12:48	10/21/20 09:07	
160-40004-13	HPPG-SFU-TU153A-011	Solid	10/14/20 14:12	10/21/20 09:07	
160-40004-23	HPPG-SFU-TU153A-021	Solid	10/14/20 14:46	10/21/20 09:07	

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40004-2
 SDG: GJ46599782

Client Sample ID: HPPG-SFU-TU153A-001

Lab Sample ID: 160-40004-3

Date Collected: 10/14/20 12:48

Matrix: Solid

Date Received: 10/21/20 09:07

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-239/240	-0.00409	U	0.00818	0.00819	0.100	0.00825	pCi/g	12/08/20 18:08	12/29/20 09:30	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Pu-242 (T)	86.3		30 - 110					12/08/20 18:08	12/29/20 09:30	1

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Uranium-235/236	0.0312		0.0250	0.0251	0.100	0.0148	pCi/g	12/08/20 18:27	12/29/20 15:25	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	108		30 - 110					12/08/20 18:27	12/29/20 15:25	1

Client Sample ID: HPPG-SFU-TU153A-011

Lab Sample ID: 160-40004-13

Date Collected: 10/14/20 14:12

Matrix: Solid

Date Received: 10/21/20 09:07

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-239/240	0.00591	U	0.0104	0.0104	0.100	0.00649	pCi/g	12/08/20 18:08	12/29/20 09:30	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Pu-242 (T)	92.3		30 - 110					12/08/20 18:08	12/29/20 09:30	1

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Uranium-235/236	0.00517	U	0.0207	0.0207	0.100	0.0159	pCi/g	12/08/20 18:27	12/29/20 15:25	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	104		30 - 110					12/08/20 18:27	12/29/20 15:25	1

Client Sample ID: HPPG-SFU-TU153A-021

Lab Sample ID: 160-40004-23

Date Collected: 10/14/20 14:46

Matrix: Solid

Date Received: 10/21/20 09:07

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-239/240	0.00420	U	0.0103	0.0103	0.100	0.00691	pCi/g	12/08/20 18:08	12/29/20 09:30	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Pu-242 (T)	81.4		30 - 110					12/08/20 18:08	12/29/20 09:30	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40004-2
 SDG: GJ46599782

Client Sample ID: HPPG-SFU-TU153A-021

Lab Sample ID: 160-40004-23

Date Collected: 10/14/20 14:46

Matrix: Solid

Date Received: 10/21/20 09:07

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Uranium-235/236	0.00748	U	0.0150	0.0150	0.100	0.0100	pCi/g	12/08/20 18:27	12/29/20 15:25	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	105		30 - 110					12/08/20 18:27	12/29/20 15:25	1

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40004-2
 SDG: GJ46599782

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Lab Sample ID: MB 160-491192/1-A
Matrix: Solid
Analysis Batch: 493438

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 491192

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Uranium-235/236	0.002324	U	0.0154	0.0154	0.100	0.0121	pCi/g	12/08/20 18:27	12/29/20 15:25	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	110		30 - 110					12/08/20 18:27	12/29/20 15:25	1

Lab Sample ID: LCS 160-491192/2-A
Matrix: Solid
Analysis Batch: 493439

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 491192

Analyte	Spike Added	LCS	LCS	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits
		Result	Qual	Uncert. (2σ+/-)					
Uranium-234	3.18	2.973		0.294	0.100	0.0114	pCi/g	93	84 - 120
Uranium-238	3.26	3.045		0.299	0.100	0.00463	pCi/g	94	82 - 122
Tracer	%Yield	Qualifier	Limits						
Uranium-232	99.3		30 - 110						

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Lab Sample ID: MB 160-491191/1-A
Matrix: Solid
Analysis Batch: 493386

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 491191

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Plutonium-239/240	0.003831	U	0.00938	0.00939	0.100	0.00630	pCi/g	12/08/20 18:08	12/29/20 09:30	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Pu-242 (T)	93.0		30 - 110					12/08/20 18:08	12/29/20 09:30	1

Lab Sample ID: LCS 160-491191/2-A
Matrix: Solid
Analysis Batch: 493387

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 491191

Analyte	Spike Added	LCS	LCS	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits
		Result	Qual	Uncert. (2σ+/-)					
Plutonium-239/240	2.64	2.491		0.250	0.100	0.00439	pCi/g	94	81 - 125
Tracer	%Yield	Qualifier	Limits						
Pu-242 (T)	97.0		30 - 110						

QC Association Summary

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40004-2
 SDG: GJ46599782

Rad

Leach Batch: 490791

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40004-3	HPPG-SFU-TU153A-001	Total/NA	Solid	Dry and Grind	
160-40004-13	HPPG-SFU-TU153A-011	Total/NA	Solid	Dry and Grind	
160-40004-23	HPPG-SFU-TU153A-021	Total/NA	Solid	Dry and Grind	

Prep Batch: 491191

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40004-3	HPPG-SFU-TU153A-001	Total/NA	Solid	ExtChrom	490791
160-40004-13	HPPG-SFU-TU153A-011	Total/NA	Solid	ExtChrom	490791
160-40004-23	HPPG-SFU-TU153A-021	Total/NA	Solid	ExtChrom	490791
MB 160-491191/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-491191/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	

Prep Batch: 491192

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40004-3	HPPG-SFU-TU153A-001	Total/NA	Solid	ExtChrom	490791
160-40004-13	HPPG-SFU-TU153A-011	Total/NA	Solid	ExtChrom	490791
160-40004-23	HPPG-SFU-TU153A-021	Total/NA	Solid	ExtChrom	490791
MB 160-491192/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-491192/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	

Tracer/Carrier Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40004-2
SDG: GJ46599782

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Matrix: Solid

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)	
Lab Sample ID	Client Sample ID	Pu-242 (T) (30-110)	
160-40004-3	HPPG-SFU-TU153A-001	86.3	
160-40004-13	HPPG-SFU-TU153A-011	92.3	
160-40004-23	HPPG-SFU-TU153A-021	81.4	
LCS 160-491191/2-A	Lab Control Sample	97.0	
MB 160-491191/1-A	Method Blank	93.0	

Tracer/Carrier Legend
Pu-242 (T) = Pu-242 (T)

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Matrix: Solid

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)	
Lab Sample ID	Client Sample ID	U-232 (30-110)	
160-40004-3	HPPG-SFU-TU153A-001	108	
160-40004-13	HPPG-SFU-TU153A-011	104	
160-40004-23	HPPG-SFU-TU153A-021	105	
LCS 160-491192/2-A	Lab Control Sample	99.3	
MB 160-491192/1-A	Method Blank	110	

Tracer/Carrier Legend
U-232 = Uranium-232



Environment Testing America

ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

Laboratory Job ID: 160-40005-1
Laboratory Sample Delivery Group: GJ46599782
Client Project/Site: HPNS-Parcel G 501197
Revision: 1

For:
Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
Concord, California 94520

Attn: Rose Condit

Rhonda Ridenhower

Authorized for release by:
4/13/2021 10:38:40 AM

Rhonda Ridenhower, Client Service Manager
(314)298-8566
Rhonda.Ridenhower@Eurofinset.com

LINKS

Review your project
results through
TotalAccess

Have a Question?



Visit us at:

www.eurofinsus.com/Env

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

1

2

3

4

5

6

7

8

9

10

11

12



Table of Contents

Cover Page	1
Table of Contents	2
Case Narrative	3
Chain of Custody	5
Receipt Checklists	7
Definitions/Glossary	8
Method Summary	9
Sample Summary	10
Client Sample Results	11
QC Sample Results	12
QC Association Summary	14
Tracer Carrier Summary	15

Case Narrative

Page 121 of 150

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40005-1
SDG: GJ46599782

Job ID: 160-40005-1

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: HPNS-Parcel G 501197

Report Number: 160-40005-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

Revision 1- Additional information requested in case narrative for total strontium

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40005-1
 SDG: GJ46599782

Job ID: 160-40005-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

RECEIPT

The samples were received on 10/21/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 17.6 C.

TOTAL BETA STRONTIUM (GFPC)

Sample HPPG-SFU-TU153A-B-001 (160-40005-1) was analyzed for Total Beta Strontium (GFPC) in accordance with EPA 905. The samples were dried on 10/26/2020, prepared on 11/06/2020 and analyzed on 11/26/2020.

When taking small mass aliquots from dried/disaggregated sample, the laboratory avoids large rocks/pebbles (as well as sticks, etc) which may constitute a larger than representative portion of the aliquot. Smaller rocks may be included. This is consistent with QSM and Laboratory SOP: HPPG-SFU-TU153A-B-001 (160-40005-1).

The method blank (MB) z-score is within limits and is stored in the level IV raw data.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Sample HPPG-SFU-TU153A-B-001 (160-40005-1) was analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA_01_R. The samples were dried on 10/26/2020, prepared on 10/31/2020 and analyzed on 11/23/2020.

Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

Inferred from	Reported to Analyte
Th-234	Pa-234
Th-234	U-238
Pb-210	Po-210
Pb-210	Bi-210
Cs-137	Ba-137m
Pb-212	Po-216
Xe-131m	Xe-131
Sb-125	Te-125m
Ag-108m	Ag-108
Rh-106	Ru-106
Pb-212	Th-228
Pb-212	Ra-224
U-235	Th-231
Ac-228	Th-232
Ac-228	Ra-228
Th-227	Ra-223
Th-227	Ac-227
Th-227	Bi-211
Th-227	Pb-211
Bi-214	Ra-226

The method blank (MB) z-score associated with Prep Batch 160-487563 is within limits and is stored in the level IV raw data. (MB 160-487563/1-A)

The cesium-137 detection goal of 0.0700 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline. HPPG-SFU-TU153A-B-001 (160-40005-1)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



CHAIN OF CUSTODY

Ref. Document # 501197RSY-011

APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy

Sample Lead: Lewis, Devin

Sample Tech(s):

Project Number: 501197

Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action

Project Location: San Francisco, CA

Purchase Order #: 1159058

Shipment/Pickup Date: 10/20/2020

Waybill Number: 4957 0225 2278

Lab Destination: Test America (St. Louis Lab)
13715 Rider Trail North
Earth City, MO 63046

Lab Contact Name/ph #: Rhoeda Ridenbower (314)298-8566

Analysis Requested



160-40005 Chain of Custody

Sample ID	Collection Information			Matrix	# of Containers	Container Type	Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Total Strontium (EPA 905 MOD)	Strontium-90 (EPA 905 MOD)	Dose Rate uR/Hr	Evidence Bag ID	Comment
	Date	Time	Method									
HPPG-SFU-TU153A-B-001	10/15/2020	09:27	G	SO	1	16 oz. plastic jar	X	X	X		GJ46599782	

Special Instructions:

21 day ingrowth results only

Analyze for Total Strontium as a screening step, and isotopic Sr-90 only if Total Strontium is above project action limit of 0.331 pCi/g

Turnaround Time: 3-day 10-Day 28-day Other

Level of QC Required: I II III Project Specific

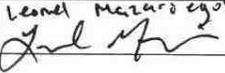
Method Codes C = Composite G = Grab Matrix Codes: DW = Drinking Water; So = Soil; GW = Ground Water; SL = Sludge; WW = Waste Water; CP = Chip Samples; A = Air; ABS = Asbestos; PO = Pipe Opening

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		10/15/2020 17:01	Locked Storage (RKillpack)		10/15/2020 17:01
Locked Storage (RKillpack)		10/20/2020 13:30	Devin Lewis		10/20/2020 13:30
Devin Lewis		10/20/2020 14:41	SHIPPEDTOLAB		10/21/2020 0907

*** Last 3 transfers shown above - Complete list of transfers on last page ***



All Transfers for COC 501197RSY-011

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		10/15/2020 17:01	Locked Storage (RKillpack)		10/15/2020 17:01
Locked Storage (RKillpack)		10/20/2020 13:30	Devin Lewis		10/20/2020 13:30
Devin Lewis		10/20/2020 14:41	SHIPPEDTOLAB	Leonel Mazaros egos 	10/21/2020 09:07



Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-40005-1

SDG Number: GJ46599782

Login Number: 40005**List Source: Eurofins TestAmerica, St. Louis****List Number: 1****Creator: Korrinhizer, Micha L**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40005-1
SDG: GJ46599782

Qualifiers

Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Method Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40005-1
SDG: GJ46599782

Method	Method Description	Protocol	Laboratory
905.0	Total Beta Strontium (GFPC)	DOE	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-0	Preparation, Digestion/ Precipitate	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy
None = None

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566



Sample Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40005-1
SDG: GJ46599782

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-40005-1	HPPG-SFU-TU153A-B-001	Solid	10/15/20 09:27	10/21/20 09:07	

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40005-1
 SDG: GJ46599782

Client Sample ID: HPPG-SFU-TU153A-B-001

Lab Sample ID: 160-40005-1

Date Collected: 10/15/20 09:27

Matrix: Solid

Date Received: 10/21/20 09:07

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	-0.0105	U	0.0581	0.0581	0.160	0.0487	pCi/g	11/06/20 11:01	11/26/20 10:43	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	93.4		40 - 110					11/06/20 11:01	11/26/20 10:43	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-227	-0.401	U	0.766	0.767		0.462	pCi/g	10/31/20 12:08	11/23/20 21:37	1
Actinium 228	0.0987	U	0.275	0.275		0.147	pCi/g	10/31/20 12:08	11/23/20 21:37	1
Bismuth-212	0.562	U	1.07	1.07		0.841	pCi/g	10/31/20 12:08	11/23/20 21:37	1
Bismuth-214	0.385		0.126	0.134		0.0478	pCi/g	10/31/20 12:08	11/23/20 21:37	1
Cesium-137	-0.0247	U	0.0335	0.0336	0.0700	0.0734	pCi/g	10/31/20 12:08	11/23/20 21:37	1
Lead-210	1.58		1.52	1.54		0.959	pCi/g	10/31/20 12:08	11/23/20 21:37	1
Lead-212	0.369		0.0962	0.106		0.0515	pCi/g	10/31/20 12:08	11/23/20 21:37	1
Lead-214	0.363		0.119	0.126		0.0631	pCi/g	10/31/20 12:08	11/23/20 21:37	1
Potassium-40	8.07		1.41	1.69		0.283	pCi/g	10/31/20 12:08	11/23/20 21:37	1
Protactinium-231	-1.03	U	3.49	3.49		2.84	pCi/g	10/31/20 12:08	11/23/20 21:37	1
Protactinium-234	0.0115	U	0.0214	0.0215		0.280	pCi/g	10/31/20 12:08	11/23/20 21:37	1
Radium-226	0.385		0.126	0.134	0.200	0.0478	pCi/g	10/31/20 12:08	11/23/20 21:37	1
Radium-228	0.0987	U	0.275	0.275		0.147	pCi/g	10/31/20 12:08	11/23/20 21:37	1
Thallium-208	0.110		0.0830	0.0839		0.0386	pCi/g	10/31/20 12:08	11/23/20 21:37	1
Thorium-232	0.0987	U	0.275	0.275		0.147	pCi/g	10/31/20 12:08	11/23/20 21:37	1
Thorium-234	-0.319	U	1.01	1.01		0.837	pCi/g	10/31/20 12:08	11/23/20 21:37	1
Thorium 228	0.369		0.0962	0.106		0.0515	pCi/g	10/31/20 12:08	11/23/20 21:37	1
Uranium-235	-0.0115	U	0.533	0.533		0.511	pCi/g	10/31/20 12:08	11/23/20 21:37	1
Uranium-238	-0.319	U	1.01	1.01		0.837	pCi/g	10/31/20 12:08	11/23/20 21:37	1

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40005-1
 SDG: GJ46599782

Method: 905.0 - Total Beta Strontium (GFPC)

Lab Sample ID: MB 160-488460/24-A
Matrix: Solid
Analysis Batch: 490292

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 488460

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Total Beta Strontium	-0.01989	U	0.0586	0.0586	0.160	0.0499	pCi/g	11/06/20 11:01	11/26/20 10:48	1
Carrier	%Yield	MB Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	86.4		40 - 110					11/06/20 11:01	11/26/20 10:48	1

Lab Sample ID: LCS 160-488460/1-A
Matrix: Solid
Analysis Batch: 490302

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 488460

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits
				Uncert. (2σ+/-)					
Total Beta Strontium	7.77	6.487		0.537	0.160	0.0549	pCi/g	83	75 - 125
Carrier	LCS %Yield	LCS Qualifier	Limits						
Sr Carrier	89.5		40 - 110						

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-487563/1-A
Matrix: Solid
Analysis Batch: 489963

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 487563

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium-227	0.03654	U	0.0895	0.0897		0.311	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Actinium 228	-0.02197	U	0.0434	0.0435		0.137	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Bismuth-212	-0.5732	U	0.947	0.949		0.728	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Bismuth-214	0.005591	U	0.00730	0.00733		0.152	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Cesium-137	-0.04570	U	0.0814	0.0816	0.0700	0.0631	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Lead-210	0.5695	U	1.56	1.57		1.02	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Lead-212	-0.007227	U	0.0816	0.0816		0.0674	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Lead-214	-0.09487	U	0.123	0.123		0.110	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Potassium-40	-0.2454	U	0.750	0.750		0.494	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Protactinium-231	0.0000	U	0.748	0.748		2.54	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Protactinium-234	-0.08399	U	0.269	0.269		0.218	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Radium-226	0.005591	U	0.00730	0.00733	0.200	0.152	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Radium-228	-0.02197	U	0.0434	0.0435		0.137	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Thallium-208	-0.03789	U	0.0628	0.0629		0.0456	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Thorium-232	-0.02197	U	0.0434	0.0435		0.137	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Thorium-234	-1.207	U	0.802	0.813		0.802	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Thorium 228	-0.007227	U	0.0816	0.0816		0.0674	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Uranium-235	0.1218	U	0.395	0.395		0.319	pCi/g	10/31/20 12:08	11/23/20 21:02	1
Uranium-238	-1.207	U	0.802	0.813		0.802	pCi/g	10/31/20 12:08	11/23/20 21:02	1

QC Sample Results

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40005-1
SDG: GJ46599782

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: LCS 160-487563/2-A
Matrix: Solid
Analysis Batch: 489982

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 487563

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec. Limits	
Americium-241	96.4	97.02		10.2		0.616	pCi/g	101	87 - 116	
Cesium-137	26.8	27.03		2.92	0.0700	0.116	pCi/g	101	87 - 120	
Cobalt-60	9.53	9.349		1.01		0.0186	pCi/g	98	87 - 115	



QC Association Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40005-1
SDG: GJ46599782

Rad

Leach Batch: 486856

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40005-1	HPPG-SFU-TU153A-B-001	Total/NA	Solid	Dry and Grind	

Prep Batch: 487563

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40005-1	HPPG-SFU-TU153A-B-001	Total/NA	Solid	Fill_Geo-21	486856
MB 160-487563/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-487563/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	

Prep Batch: 488460

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40005-1	HPPG-SFU-TU153A-B-001	Total/NA	Solid	DPS-0	486856
MB 160-488460/24-A	Method Blank	Total/NA	Solid	DPS-0	
LCS 160-488460/1-A	Lab Control Sample	Total/NA	Solid	DPS-0	

Tracer/Carrier Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40005-1
SDG: GJ46599782

Method: 905.0 - Total Beta Strontium (GFPC)

Matrix: Solid

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)	
Lab Sample ID	Client Sample ID	Sr (40-110)	
160-40005-1	HPPG-SFU-TU153A-B-001	93.4	
LCS 160-488460/1-A	Lab Control Sample	89.5	
MB 160-488460/24-A	Method Blank	86.4	

Tracer/Carrier Legend
Sr = Sr Carrier

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12



Environment Testing America

ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

Laboratory Job ID: 160-40005-2
Laboratory Sample Delivery Group: GJ46599782
Client Project/Site: HPNS-Parcel G 501197

For:
Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
Concord, California 94520

Attn: Rose Condit

Rhonda Ridenhower

Authorized for release by:
1/11/2021 3:12:42 PM

Rhonda Ridenhower, Client Service Manager
(314)298-8566
Rhonda.Ridenhower@Eurofinset.com

LINKS

Review your project
results through
TotalAccess

Have a Question?



Visit us at:

www.eurofinsus.com/Env

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

1

2

3

4

5

6

7

8

9

10

11

12



Table of Contents

Cover Page	1
Table of Contents	2
Case Narrative	3
Chain of Custody	5
Receipt Checklists	7
Definitions/Glossary	8
Method Summary	9
Sample Summary	10
Client Sample Results	11
QC Sample Results	12
QC Association Summary	14
Tracer Carrier Summary	15

Case Narrative

Page 136 of 150

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40005-2
SDG: GJ46599782

Job ID: 160-40005-2

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: HPNS-Parcel G 501197

Report Number: 160-40005-2

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

RECEIPT

The samples were received on 10/21/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at

Case Narrative

Page 137 of 150

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40005-2
SDG: GJ46599782

Job ID: 160-40005-2 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

receipt was 17.6 C.

Analysis requested by client and not listed on the COC.

ISOTOPIC PLUTONIUM (ALPHA SPECTROMETRY)

Sample HPPG-SFU-TU153A-B-001 (160-40005-1) was analyzed for Isotopic Plutonium (Alpha Spectrometry) in accordance with A-01-R. The samples were dried on 10/26/2020, prepared on 12/23/2020 and analyzed on 01/05/2021.

The method blank (MB) Z-score is within limits and is located in the level IV raw data. (MB 160-492888/1-A)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC URANIUM (ALPHA SPECTROMETRY)

Sample HPPG-SFU-TU153A-B-001 (160-40005-1) was analyzed for Isotopic Uranium (Alpha Spectrometry) in accordance with DOE. The samples were leached on 10/26/2020, prepared on 12/29/2020 and analyzed on 01/05/2021.

The method blank (MB) Z-score is within limits and is located in the level IV raw data. (MB 160-493334/1-A)

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



CHAIN OF CUSTODY

Ref. Document # 501197RSY-011

APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy

Sample Lead: Lewis, Devin

Sample Tech(s):

Project Number: 501197

Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action

Project Location: San Francisco, CA

Purchase Order #: 1159058

Shipment/Pickup Date: 10/20/2020

Waybill Number: 4957 0225 2278

Lab Destination: Test America (St. Louis Lab)
13715 Rider Trail North
Earth City, MO 63046

Lab Contact Name/ph #: Rhoeda Ridenbower (314)298-8566

Analysis Requested



160-40005 Chain of Custody

Sample ID	Collection Information			Matrix	# of Containers	Container Type	Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Total Strontium (EPA 905 MOD)	Strontium-90 (EPA 905 MOD)	Dose Rate uR/Hr	Evidence Bag ID	Comment
	Date	Time	Method									
HPPG-SFU-TU153A-B-001	10/15/2020	09:27	G	SO	1	16 oz. plastic jar	X	X	X		GJ46599782	

Special Instructions: **21 day ingrowth results only**

Analyze for Total Strontium as a screening step, and isotopic Sr-90 only if Total Strontium is above project action limit of 0.331 pCi/g

Turanaround Time: 3-day 10-Day 28-day Other

Level of QC Required: I II III Project Specific

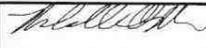
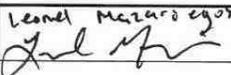
Method Codes C = Composite G = Grab Matrix Codes: DW = Drinking Water; So = Soil; GW = Ground Water; SL = Sludge; WW = Waste Water; CP = Chip Samples; A = Air; ABS = Asbestos; PO = Pipe Opening

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		10/15/2020 17:01	Locked Storage (RKillpack)		10/15/2020 17:01
Locked Storage (RKillpack)		10/20/2020 13:30	Devin Lewis		10/20/2020 13:30
Devin Lewis		10/20/2020 14:41	SHIPPEDTOLAB		10/21/2020 0907

*** Last 3 transfers shown above - Complete list of transfers on last page ***



All Transfers for COC 501197RSY-011

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		10/15/2020 17:01	Locked Storage (RKillpack)		10/15/2020 17:01
Locked Storage (RKillpack)		10/20/2020 13:30	Devin Lewis		10/20/2020 13:30
Devin Lewis		10/20/2020 14:41	SHIPPEDTOLAB	Leonel Mazaris egos 	10/21/2020 09:07



Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-40005-2

SDG Number: GJ46599782

Login Number: 40005**List Source: Eurofins TestAmerica, St. Louis****List Number: 1****Creator: Korrinhizer, Micha L**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40005-2
SDG: GJ46599782

Qualifiers

Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Method Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40005-2
SDG: GJ46599782

Method	Method Description	Protocol	Laboratory
A-01-R	Isotopic Plutonium and Neptunium (Alpha Spectrometry)	DOE	TAL SL
A-01-R	Isotopic Uranium (Alpha Spectrometry)	DOE	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
ExtChrom	Preparation, Extraction Chromatography Resin Actinide Separation	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy
None = None

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566



Sample Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40005-2
SDG: GJ46599782

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-40005-1	HPPG-SFU-TU153A-B-001	Solid	10/15/20 09:27	10/21/20 09:07	

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40005-2
 SDG: GJ46599782

Client Sample ID: HPPG-SFU-TU153A-B-001

Lab Sample ID: 160-40005-1

Date Collected: 10/15/20 09:27

Matrix: Solid

Date Received: 10/21/20 09:07

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-239/240	0.000	U	0.00860	0.00860	0.100	0.00708	pCi/g	12/23/20 09:49	01/05/21 10:05	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Pu-242 (T)	91.8		30 - 110					12/23/20 09:49	01/05/21 10:05	1

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Uranium-235/236	0.0123		0.0163	0.0163	0.100	0.00991	pCi/g	12/29/20 12:41	01/05/21 10:03	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	85.3		30 - 110					12/29/20 12:41	01/05/21 10:03	1

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40005-2
 SDG: GJ46599782

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Lab Sample ID: MB 160-493334/1-A
Matrix: Solid
Analysis Batch: 493947

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 493334

Analyte	MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	MB Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Uranium-235/236	0.004921	U	0.00696	0.00697	0.100	0.00572	pCi/g	12/29/20 12:41	01/05/21 10:03	1
Tracer	MB		Limits		Prepared	Analyzed	Dil Fac			
Uranium-232	%Yield	MB Qualifier	30 - 110							
	100				12/29/20 12:41	01/05/21 10:03	1			

Lab Sample ID: LCS 160-493334/2-A
Matrix: Solid
Analysis Batch: 493948

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 493334

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits
				Uncert. (2σ+/-)					
Uranium-234	3.18	2.982		0.297	0.100	0.0119	pCi/g	94	84 - 120
Uranium-238	3.26	3.070		0.304	0.100	0.00843	pCi/g	94	82 - 122
Tracer	LCS		Limits		Prepared	Analyzed	Dil Fac		
Uranium-232	%Yield	LCS Qualifier	30 - 110						
	83.1				12/29/20 12:41	01/05/21 10:03	1		

Lab Sample ID: 160-40005-1 DU
Matrix: Solid
Analysis Batch: 493951

Client Sample ID: HPPG-SFU-TU153A-B-001
Prep Type: Total/NA
Prep Batch: 493334

Analyte	Sample		DU		Total	LOQ	DLC	Unit	RER	RER Limit
	Result	Sample Qual	Result	DU Qual	Uncert. (2σ+/-)					
Uranium-235/236	0.0123		0.002483	U	0.0131	0.100	0.0100	pCi/g	0.33	1
Tracer	DU		Limits		Prepared	Analyzed	Dil Fac			
Uranium-232	%Yield	DU Qualifier	30 - 110							
	88.0				12/23/20 09:49	01/05/21 10:05	1			

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Lab Sample ID: MB 160-492888/1-A
Matrix: Solid
Analysis Batch: 493952

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 492888

Analyte	MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	MB Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Plutonium-239/240	0.0000	U	0.00937	0.00937	0.100	0.00770	pCi/g	12/23/20 09:49	01/05/21 10:05	1
Tracer	MB		Limits		Prepared	Analyzed	Dil Fac			
Pu-242 (T)	%Yield	MB Qualifier	30 - 110							
	88.3				12/23/20 09:49	01/05/21 10:05	1			

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40005-2
 SDG: GJ46599782

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry) (Continued)

Lab Sample ID: LCS 160-492888/2-A
Matrix: Solid
Analysis Batch: 494146

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 492888

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec. Limits
Plutonium-239/240	2.64	2.579		0.258	0.100	0.00438	pCi/g	98	81 - 125

Tracer	LCS %Yield	LCS Qualifier	Limits
Pu-242 (T)	109		30 - 110

Lab Sample ID: 160-40005-1 DU
Matrix: Solid
Analysis Batch: 493956

Client Sample ID: HPPG-SFU-TU153A-B-001
Prep Type: Total/NA
Prep Batch: 492888

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	RER	RER Limit
Plutonium-239/240	0.000	U	-0.00200	U	0.00896	0.100	0.00807	pCi/g	0.11	1

Tracer	DU %Yield	DU Qualifier	Limits
Pu-242 (T)	99.1		30 - 110

QC Association Summary

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40005-2
 SDG: GJ46599782

Rad

Leach Batch: 490794

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40005-1	HPPG-SFU-TU153A-B-001	Total/NA	Solid	Dry and Grind	
160-40005-1 DU	HPPG-SFU-TU153A-B-001	Total/NA	Solid	Dry and Grind	

Prep Batch: 492888

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40005-1	HPPG-SFU-TU153A-B-001	Total/NA	Solid	ExtChrom	490794
MB 160-492888/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-492888/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	
160-40005-1 DU	HPPG-SFU-TU153A-B-001	Total/NA	Solid	ExtChrom	490794

Prep Batch: 493334

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40005-1	HPPG-SFU-TU153A-B-001	Total/NA	Solid	ExtChrom	490794
MB 160-493334/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-493334/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	
160-40005-1 DU	HPPG-SFU-TU153A-B-001	Total/NA	Solid	ExtChrom	490794



Tracer/Carrier Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40005-2
SDG: GJ46599782

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Matrix: Solid

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)	
Lab Sample ID	Client Sample ID	Pu-242 (T) (30-110)	
160-40005-1	HPPG-SFU-TU153A-B-001	91.8	
160-40005-1 DU	HPPG-SFU-TU153A-B-001	99.1	
LCS 160-492888/2-A	Lab Control Sample	109	
MB 160-492888/1-A	Method Blank	88.3	
Tracer/Carrier Legend			
Pu-242 (T) = Pu-242 (T)			

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Matrix: Solid

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)	
Lab Sample ID	Client Sample ID	U-232 (30-110)	
160-40005-1	HPPG-SFU-TU153A-B-001	85.3	
160-40005-1 DU	HPPG-SFU-TU153A-B-001	88.0	
LCS 160-493334/2-A	Lab Control Sample	83.1	
MB 160-493334/1-A	Method Blank	100	
Tracer/Carrier Legend			
U-232 = Uranium-232			

From: [Ridenhower, Rhonda](#)
To: [Condit, Rose](#)
Cc: [Engel, Audrey](#); [Ramirez, Joaquin](#)
Subject: RE: Parcel G Alpha Spec request
Date: Wednesday, December 2, 2020 9:19:43 PM

EXTERNAL SENDER

Rose,

All samples have had Iso U and Pu added. I will post the sample confirmation in the morning.

Thank you,
Rhonda

Rhonda Ridenhower
Client Service Manager

Phone: 314-298-8566
Direct: 314-787-8227

E-mail: Rhonda.Ridenhower@eurofinset.com

From: Condit, Rose <rose.condit@aptim.com>
Sent: Wednesday, December 2, 2020 6:36 PM
To: Ridenhower, Rhonda <Rhonda.Ridenhower@Eurofinset.com>
Cc: Engel, Audrey <Audrey.Engel@aptim.com>; Ramirez, Joaquin <Joaquin.Ramirez@aptim.com>
Subject: Parcel G Alpha Spec request

EXTERNAL EMAIL*

Hi Rhonda, will you please add Alpha Spec – Pu-239 and U-235 to the following WO#s:

160-39748 (samples -01, -11, -21)

160-39749 (sample -01)

160-39827 (Sample -01, -11, -21)

160-39828 (sample -01)

160-40004 (Sample -01, -11, -21)

160-40005 (Sample -01)

160-40006 (Sample -01, -11, -21)

Let me know if you have any questions.

Rose Condit

Project Chemist

O 925 288 2151

M 925 890 5373

 rose.condit@aptim.com



* WARNING - EXTERNAL: This email originated from outside of Eurofins TestAmerica. Do not click any links or open any attachments unless you trust the sender and know that the content is safe!

Hunters Point Naval Shipyard, Parcel G, RSY Data Report Page 1 of 139

Contract No. N62473-17-D-006 CTO N6247318F5065 RSY Pad Data Report	
RSY Pad: RSY 32 Use 1	Soil Origin: TU153B ESU
Data attached and submitted by: Amy Mangel	Data Report Submittal Date: 02/09/2021

Systematic Soil Sample Data: RSY 32 Use 1									
Sample Identification	Sample Location	Type of Sample	Gamma Static 3x3 NaI Reading (CPM)	Gamma 3x3 Static Investigation Level (CPM)	²²⁶ Ra Final Analytical Results (pCi/g)	¹³⁷ Cs Final Analytical Results (pCi/g)	Total Beta Sr Final Analytical Results (pCi/g)	²³⁵ U Final Analytical Results (pCi/g)	²³⁹ Pu Final Analytical Results (pCi/g)
Project Remediation Goals*					1.861	0.141	0.331	0.195	2.59
HPPG-ESU-TU153B-001	1	Systematic	9,951	15,658	0.367	-0.0322	-0.0282	0.0236	0.00203
HPPG-ESU-TU153B-002	2	Systematic	9,718	15,658	0.460	0.0145	N/A	N/A	N/A
HPPG-ESU-TU153B-003	3	Systematic	10,374	15,658	0.491	-0.00101	N/A	N/A	N/A
HPPG-ESU-TU153B-004	4	Systematic	11,084	15,658	0.427	-0.00221	N/A	N/A	N/A
HPPG-ESU-TU153B-005	5	Systematic	9,118	15,658	0.118	-0.0253	N/A	N/A	N/A
HPPG-ESU-TU153B-006	6	Systematic	10,748	15,658	0.381	0.0199	N/A	N/A	N/A
HPPG-ESU-TU153B-007	7	Systematic	10,323	15,658	0.382	0.0274	N/A	N/A	N/A
HPPG-ESU-TU153B-008	8	Systematic	10,299	15,658	0.389	0.0267	N/A	N/A	N/A
HPPG-ESU-TU153B-009	9	Systematic	10,214	15,658	0.378	0.0422	N/A	N/A	N/A
HPPG-ESU-TU153B-010	10	Systematic	8,767	15,658	0.367	-0.0243	N/A	N/A	N/A
HPPG-ESU-TU153B-011	11	Systematic	10,666	15,658	0.380	-0.0371	-0.00903	0.00992	0.00197
HPPG-ESU-TU153B-012	12	Systematic	10,802	15,658	0.367	-0.0521	N/A	N/A	N/A
HPPG-ESU-TU153B-013	13	Systematic	10,387	15,658	0.489	0.00719	N/A	N/A	N/A
HPPG-ESU-TU153B-014	14	Systematic	10,177	15,658	0.329	0.0143	N/A	N/A	N/A
HPPG-ESU-TU153B-015	15	Systematic	9,374	15,658	0.207	-0.0243	N/A	N/A	N/A
HPPG-ESU-TU153B-016	16	Systematic	10,770	15,658	0.467	0.000177	N/A	N/A	N/A
HPPG-ESU-TU153B-017	17	Systematic	10,377	15,658	0.393	-0.000665	N/A	N/A	N/A
HPPG-ESU-TU153B-018	18	Systematic	9,952	15,658	0.326	-0.0163	N/A	N/A	N/A
HPPG-ESU-TU153B-019	19	Systematic	10,441	15,658	0.369	-0.0157	N/A	N/A	N/A
HPPG-ESU-TU153B-020	20	Systematic	9,262	15,658	0.278	0.0276	N/A	N/A	N/A
HPPG-ESU-TU153B-021	21	Systematic	9,749	15,658	0.337	0.00235	-0.00521	0.0171	-0.00396
HPPG-ESU-TU153B-022	22	Systematic	9,876	15,658	0.118	-0.0450	N/A	N/A	N/A
HPPG-ESU-TU153B-023	23	Systematic	10,641	15,658	0.458	-0.0103	N/A	N/A	N/A
HPPG-ESU-TU153B-024	24	Systematic	10,149	15,658	0.348	-0.0150	N/A	N/A	N/A
HPPG-ESU-TU153B-025	25	Systematic	9,950	15,658	0.494	0.00915	N/A	N/A	N/A
Soil Systematic Sample Statistics					²²⁶Ra Final Analytical Results (pCi/g)	¹³⁷Cs Final Analytical Results (pCi/g)	Total Beta Sr Final Analytical Results (pCi/g)	²³⁵U Final Analytical Results (pCi/g)	²³⁹Pu Final Analytical Results (pCi/g)
Maximum					0.494	0.0422	-0.00521	0.0236	0.00203
Mean					0.3648	-0.0044	-0.0141	0.0169	0.000133
Median					0.378	-0.001	-0.00903	0.0171	0.00197
Minimum					0.118	-0.0521	-0.0282	0.00992	-0.00396
Standard Deviation					0.1001	0.0244	N/A	N/A	N/A

Biased Soil Sample Data: RSY 32 Use 1									
Sample Identification	Sample Location	Type of Sample	Gamma Static 3x3 NaI Reading (CPM)	Gamma 3x3 Static Investigation Level (CPM)	²²⁶ Ra Final Analytical Results (pCi/g)	¹³⁷ Cs Final Analytical Results (pCi/g)	Total Beta Sr Final Analytical Results (pCi/g)	²³⁵ U Final Analytical Results (pCi/g)	²³⁹ Pu Final Analytical Results (pCi/g)
Project Remediation Goals*					1.861	0.141	0.331	0.195	2.59
HPPG-ESU-TU153B-B-001	1	Biased	10,924	15,658	0.404	-0.0534	0.0677	0.0238	0.0206

CPM Counts per minute
pCi/g Picocuries per gram

* Note: Project Remediation goal (RG) is the Record of Decision RG or Offsite RBA value, whichever is higher

Instrument and Survey Summary					
Activity	Survey #	Date	Meter	Calibration Due Date	Serial #
Gamma Walkover Survey	HPRS-10062020-PG-ROV-151	10/06/2020	RS-700	03/31/2022	5447/5448
Follow-Up Static Survey	HPRS-10072020-PG-JSS-152	10/07/2020	RS-700	03/31/2022	5447/5448
Systematic Sample Survey	HPRS-10072020-PG-JSS-150	10/07/2020	3x3	08/06/2021	108853
Biased Sample Survey	HPRS-10082020-PG-JSS-155	10/08/2020	3x3	08/06/2021	108853

Region of Interest (ROI) Summary	
ROI	Nuclide and Energy
ROI 3	Ra-226 (1764 keV)
ROI 6	Ra-226 (609 keV)
ROI 7	Cs-137 (662 keV)
ROI 8	Ra-226 (351 keV)
ROI 10	Gross Gamma

Summary: RSY 32 Use 1
<p>1) Gamma walkover survey and data review—upon review of initial RS-700 scan data in accordance with Final Parcel G Work Plan Section 3.5.1.1, 42 follow-up static investigations were required. Gamma scan data summary statistics, normal Q-Q plots, histograms, and box plots are provided on pages 3-6. Contour maps of the scan data for the ROIs of interest are presented on page 7. The RSY scan data was lower than the background scan data. The exact same RS-700 and detectors were used for the background data collection and the RSY pad data collection.</p>
<p>2) One-minute static follow-up measurements with the RS-700 were collected at 42 gamma walkover investigation locations in accordance with Final Parcel G Work Plan Section 3.3.1. A map of the follow-up locations is presented on page 9. The net follow-up static spectra are presented on pages 14-55. The exact same RS-700 and detectors were used for the background data collection and the RSY pad data collection.</p>
<p>3) In accordance with Final Parcel G Work Plan Section 3.4.1, twenty-five systematic soil samples (001-025) were obtained and submitted for gamma spectroscopy analysis. Sample locations are shown on the Systematic Sample Survey map (page 10). TestAmerica sample results are attached (pages 56-107). Ten percent of the systematic soil samples (three samples in total -001, -011, & -021) were also analyzed for total strontium. Total Strontium results are also included in the TestAmerica sample results report (pages 56-107). Samples HPPG-F-007 and HPPG-F-008 are field duplicates, correlating to systematic samples -004 and -014. The Data Quality Assessment which will be included in the RACR will provide an analysis and discussion of field duplicates for the project. The alpha spectroscopy analyses for Uranium-235 and Plutonium-239 were requested after the samples and COC had been shipped to the lab (pages 138-139), which is why those analyses are not marked on the COCs. The Instrument and Survey Summary table above lists the 3x3 NaI detector used for the gamma static measurements collected during sampling activities, and the instrument-specific gamma static IL listed in the sample tables on page one is developed from that instrument's RBA data.</p> <p>Systematic sample histograms, box plots, Q-Q plots, and power curves are provided on pages 12-13. All sample results were below the applicable RGs. The number of samples collected was sufficient to meet project DQOs.</p>
<p>4) In accordance with Final Parcel G Work Plan Section 3.3.1 and 3.4.1, one biased sample was collected since all follow-up static measurements were below the ROC-specific critical levels. The biased sample was collected from the location of the highest gross gamma scan measurement. TestAmerica sample results are attached (pages 108-137). A map of the biased sample location is presented on page 11. Biased sample results were all below the applicable RGs.</p>
<p>Conclusions:</p> <p>In accordance with the DQOs in Section 3.1 of the Final Parcel G Work Plan, final analytical results for all samples from the RSY pad were shown by a point by point comparison to meet the RGs. Graphical comparisons demonstrated that ROC concentrations were consistent with background.</p> <p>RSY 32 Use 1 contains soil from Hunters Point Naval Shipyard Parcel G Phase 1 excavation TU-153B ESU.</p> <p>APTIM requests RASO concurrence to release this soil as Non-LLRW.</p> <p>Disposition: This soil shall be used as backfill for TU-153.</p>

Soil Scan Statistics

Statistical Summary

Dataset	PG-RSY-32-U1				
ROI	Minimum (cps)	Maximum (cps)	Mean (cps)	Median (cps)	Standard Deviation (cps)
ROI-03	3.01	31.07	14.42	14.03	3.97
ROI-06	55.13	137.34	95.03	95.20	11.65
ROI-07	40.09	113.22	73.38	73.16	9.63
ROI-08	79.17	170.36	118.64	119.22	13.23
ROI-10	1,952.53	2,771.88	2,422.10	2,452.51	137.91

Statistical Summary Reference Background

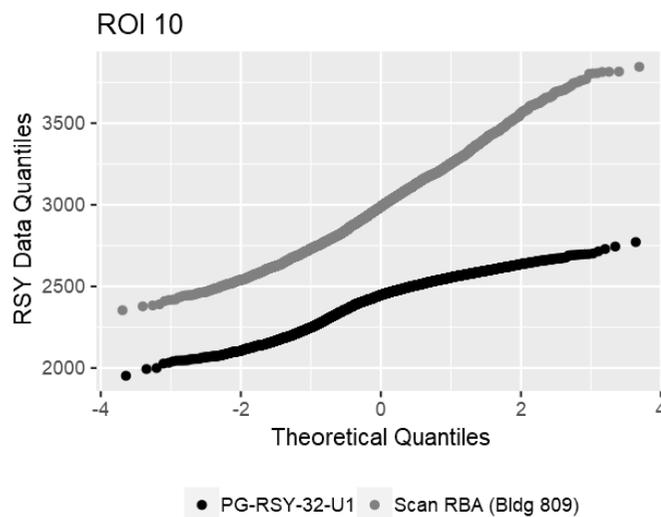
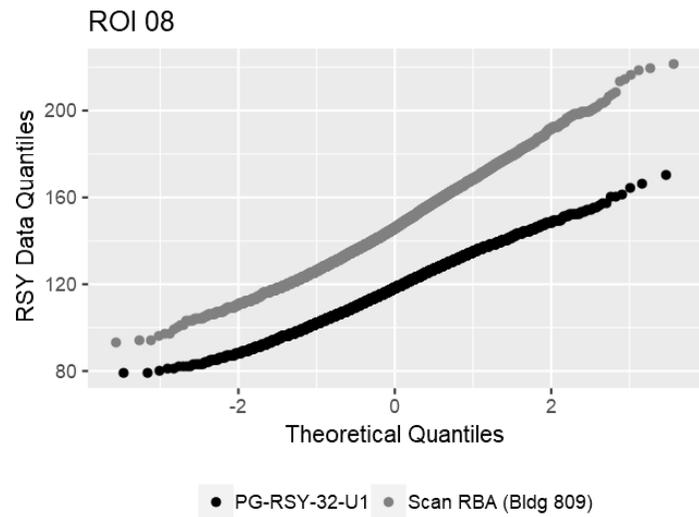
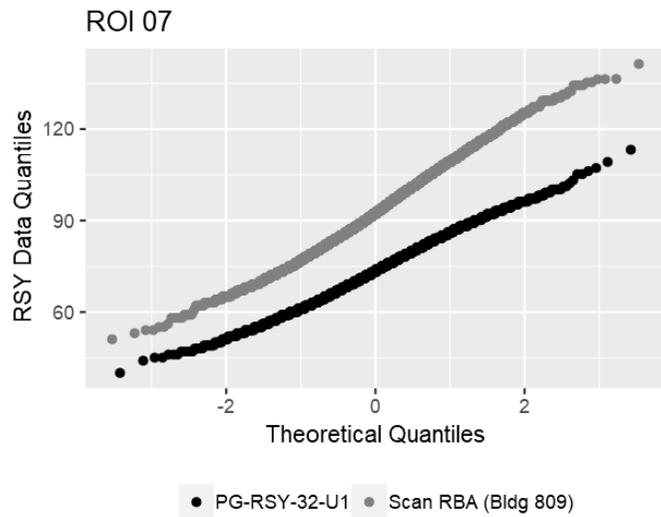
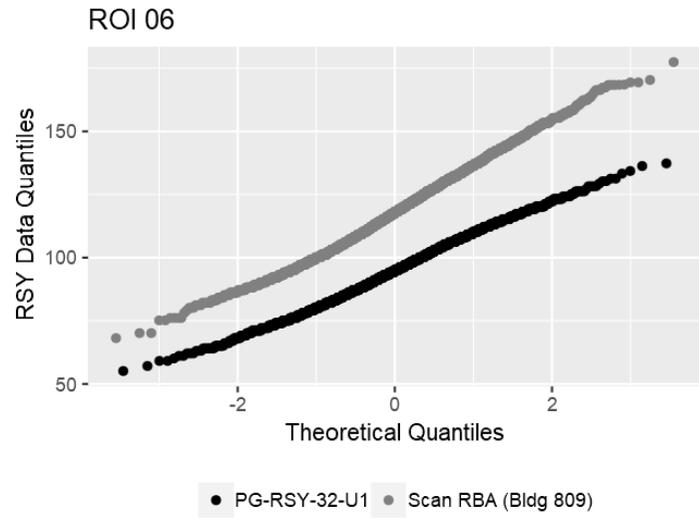
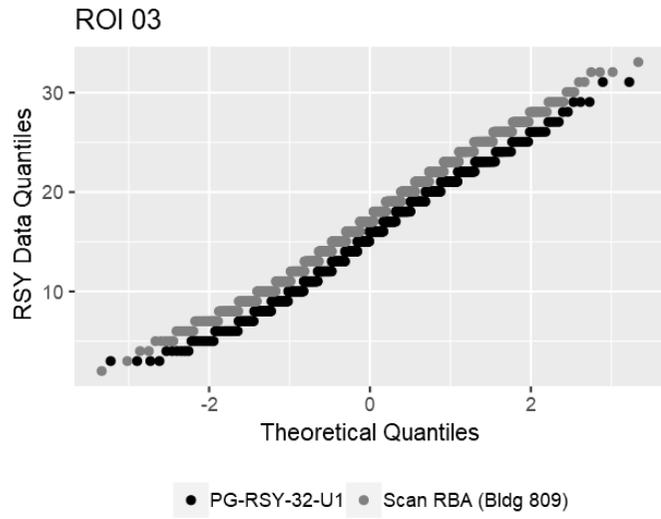
TYPE	Scan RBA (Bldg 809)				
ROI	Minimum (cps)	Maximum (cps)	Mean (cps)	Median (cps)	Standard Deviation (cps)
ROI-03	2.00	33.08	16.21	16.04	4.13
ROI-06	68.15	177.45	117.58	117.26	15.50
ROI-07	51.11	141.33	92.34	91.24	13.43
ROI-08	93.19	221.48	146.24	145.30	18.21
ROI-10	2,354.11	3,845.31	2,995.57	2,989.64	255.66

cps = counts per second

Dataset	Number of Data Points
PG-RSY-32-U1	4178
Scan RBA (Bldg 809)	4632

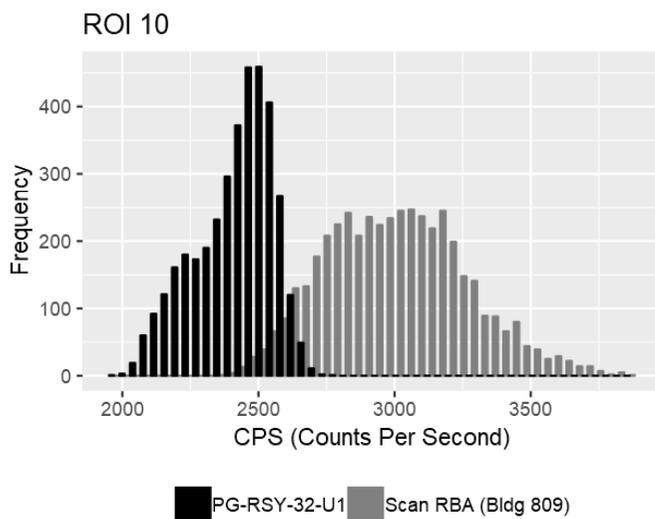
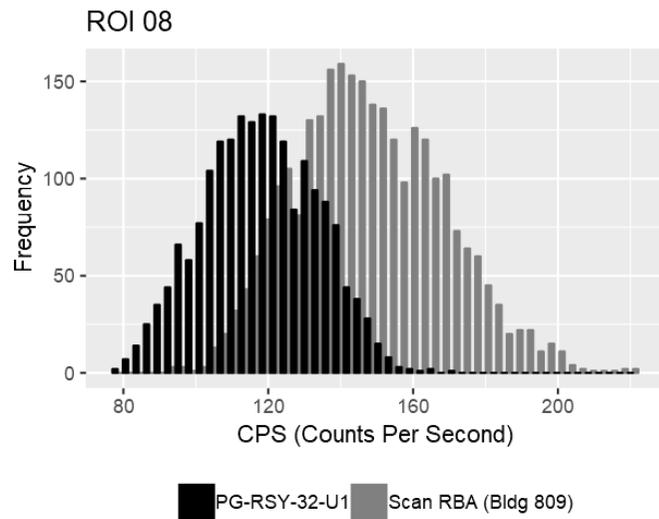
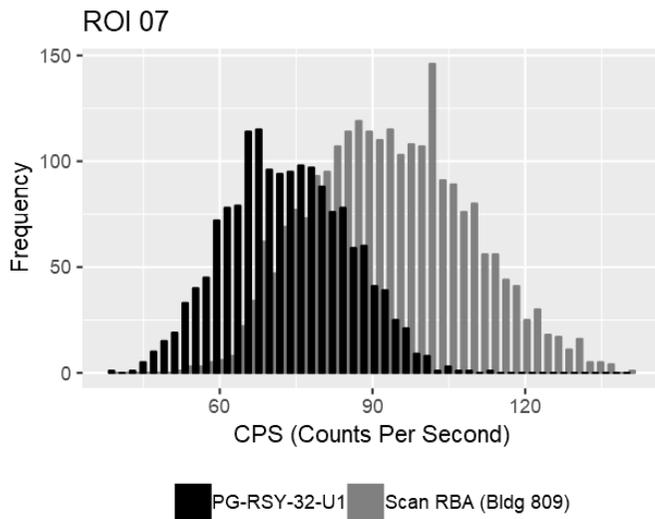
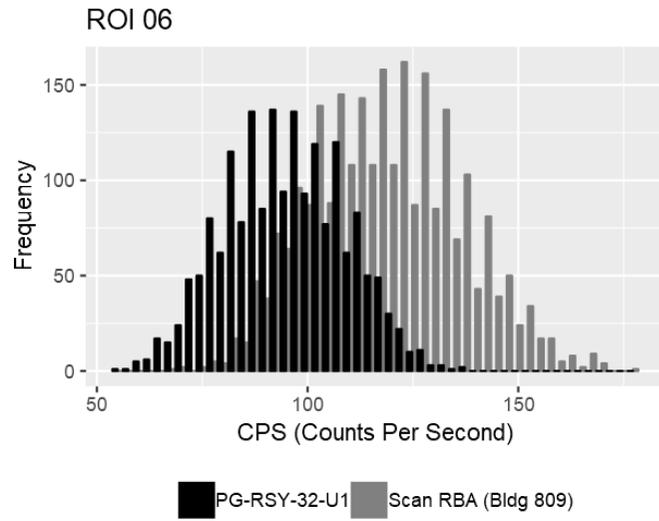
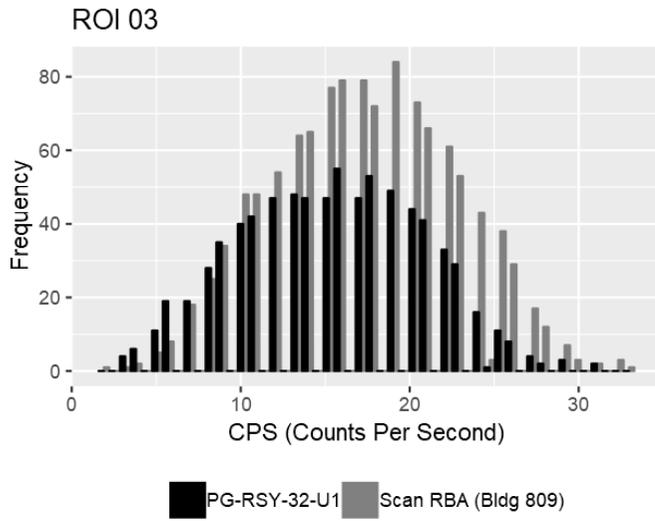
Soil Scan Statistics

Normal Q-Q Plots



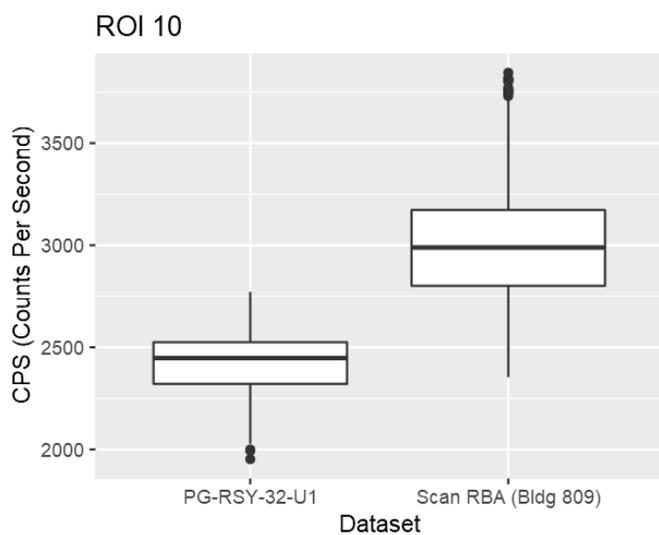
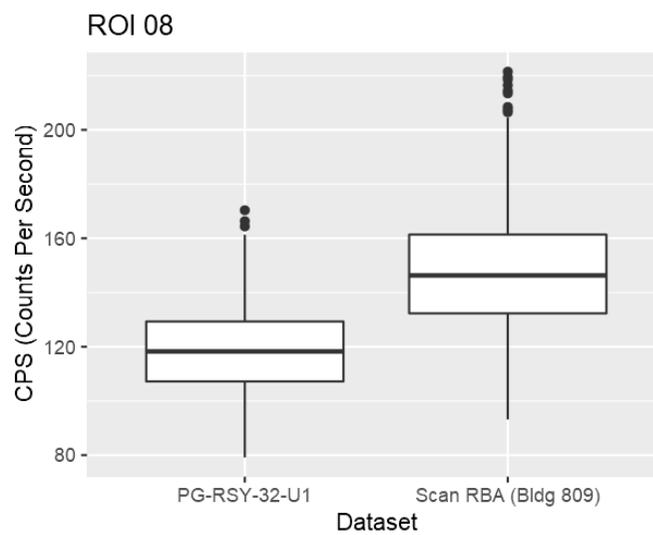
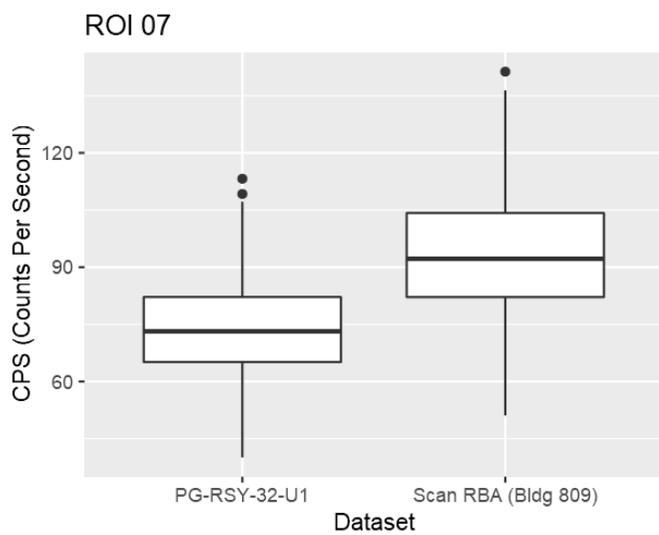
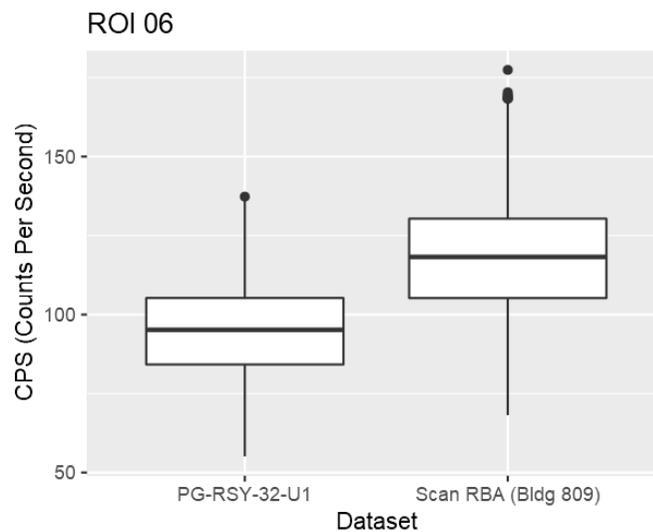
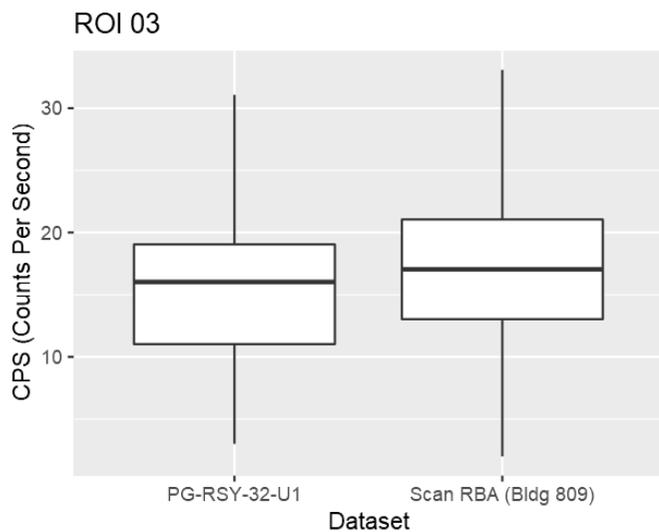
Soil Scan Statistics

Histograms



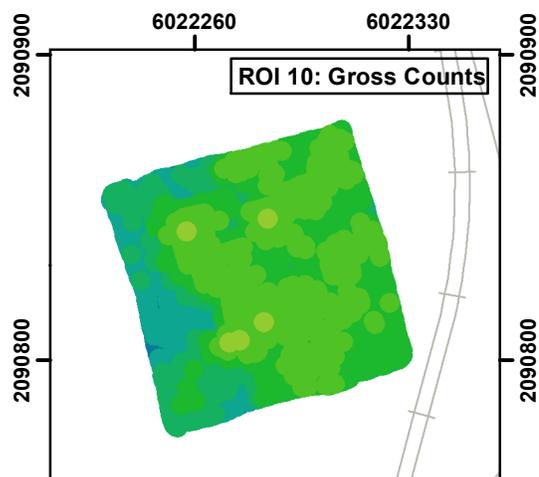
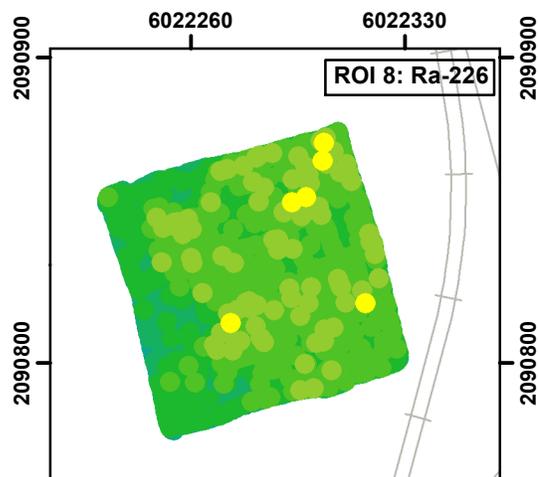
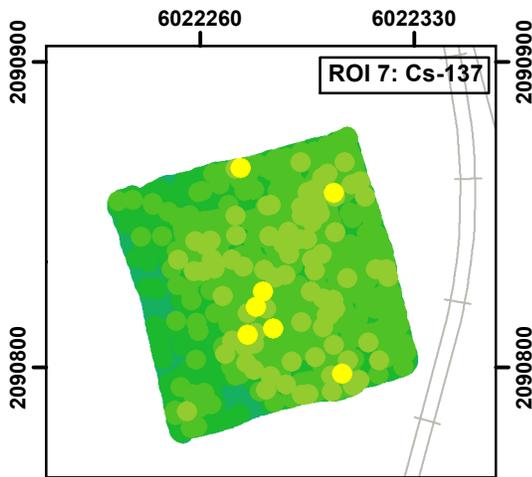
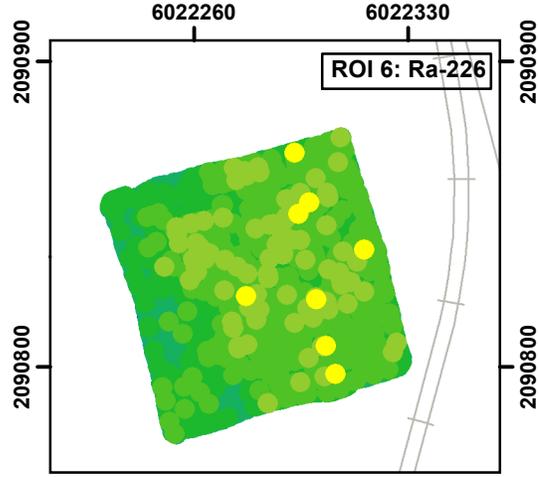
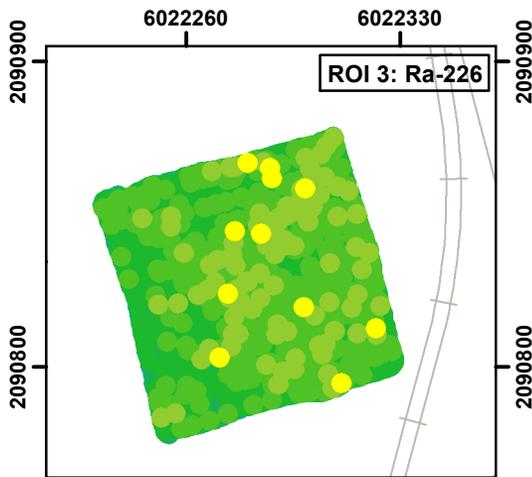
Soil Scan Statistics

Box Plots



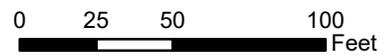
RSI Data Plots
HPNS Parcel G
RSY 32 Use 1

TU-153B ESU



RS 700 Gamma Walkover Survey Data (VD1)

- | | |
|--|--|
| ● > 3 std dev | ● > -1 to < 0 std dev |
| ● > 2 to < 3 std dev | ● > -2 to < -1 std dev |
| ● > 1 to < 2 std dev | ● > -3 to < -2 std dev |
| ● > 0 to < 1 std dev | ● < -3 std dev |

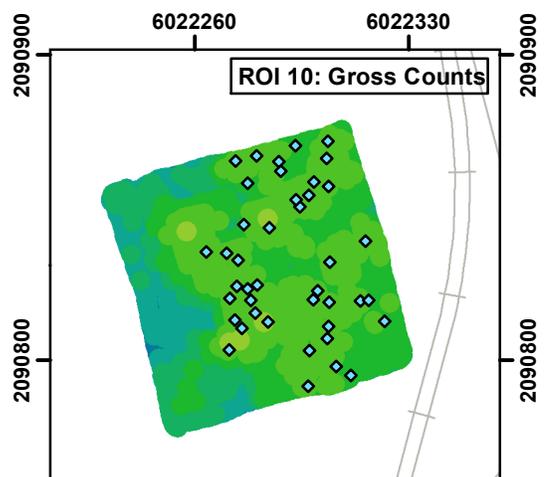
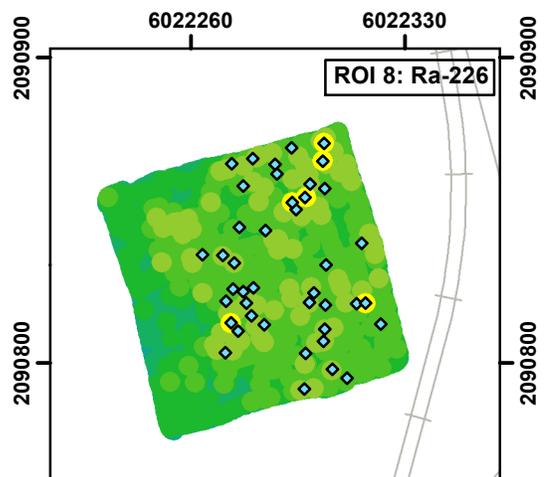
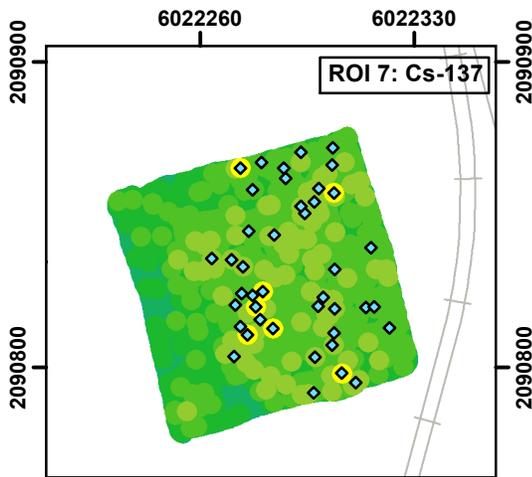
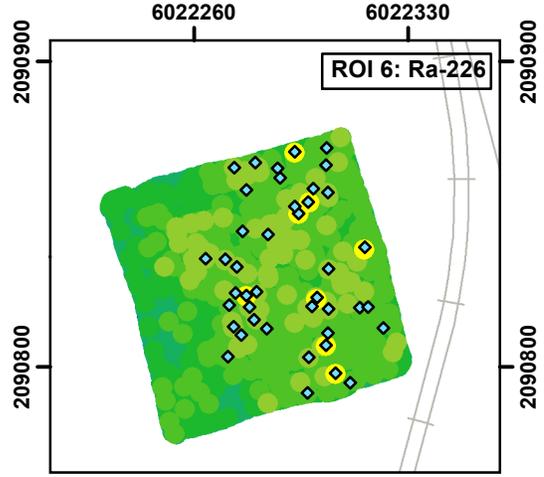
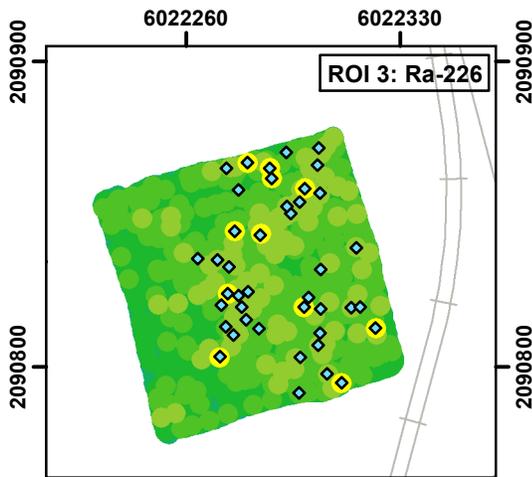


Coordinate system: CSP Zone III, NAD83, US Survey Foot



RSI Data Plots
HPNS Parcel G
RSY 32 Use 1

TU-153B ESU



RS 700 Gamma Walkover Survey Data (VD1)

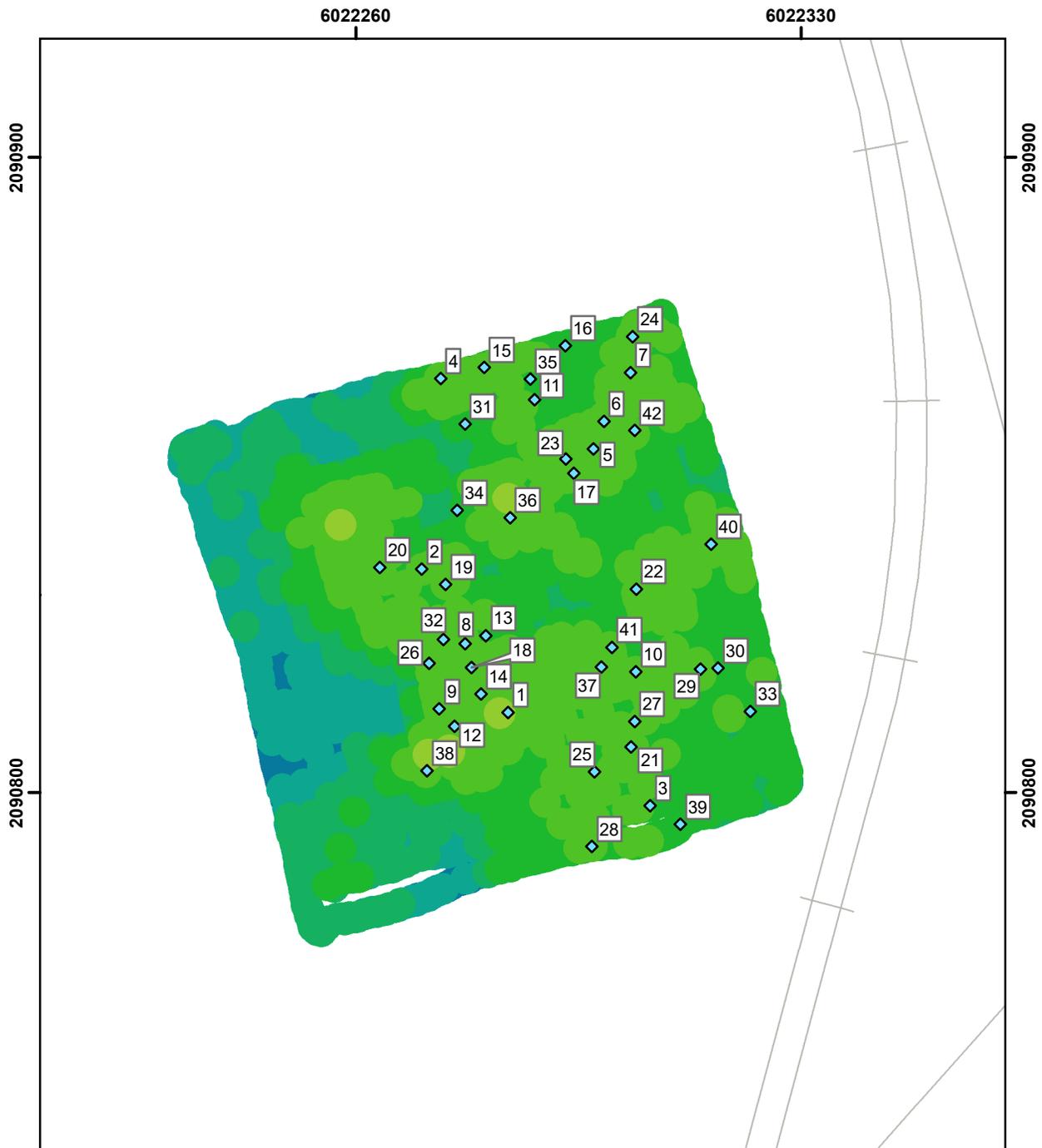
◆ Follow-Up Locations	● > -1 to < 0 std dev
● > 3 std dev	● > -2 to < -1 std dev
● > 2 to < 3 std dev	● > -3 to < -2 std dev
● > 1 to < 2 std dev	● < -3 std dev
● > 0 to < 1 std dev	

0 25 50 100 Feet

Coordinate system: CSP Zone III, NAD83, US Survey Foot

Follow-Up Static Survey
 HPNS Parcel G
 RSY 32 Use 1

TU-153B ESU



RSY 32 Use 1 (VD1, ROI 10 Gross Gamma)

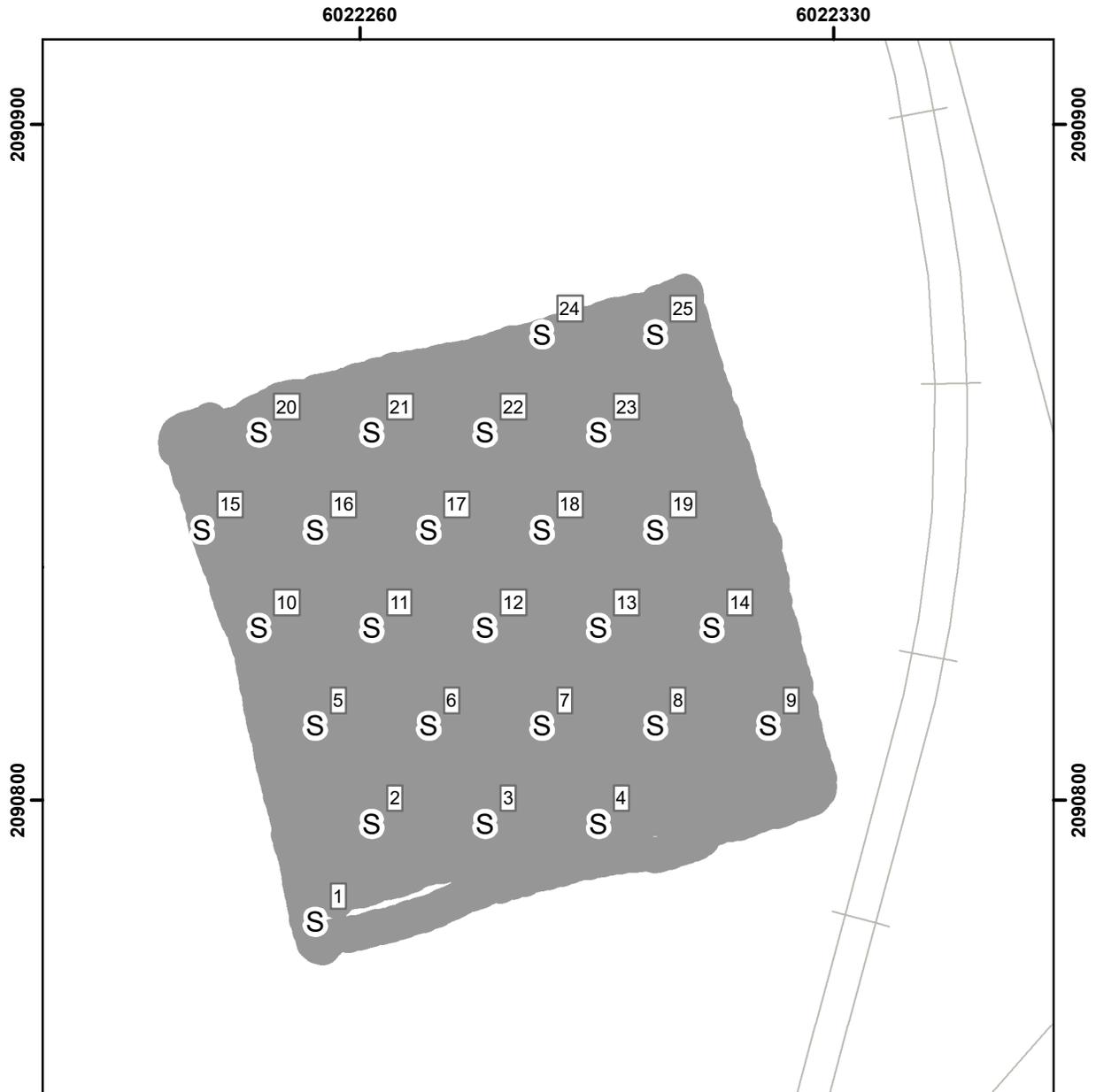
◆ Follow-Up Locations	● > 1 to < 2 std dev	● > -2 to < -1 std dev
● > 3 std dev	● > 0 to < 1 std dev	● > -3 to < -2 std dev
● > 2 to < 3 std dev	● > -1 to < 0 std dev	● < -3 std dev

25 12.5 0 25 Feet

Coordinate system: CSP Zone III, NAD83, US Survey Foot

**Systematic Sampling
HPNS Parcel G
RSY 32 Use 1**

TU-153B ESU



RSY 32 Use 1

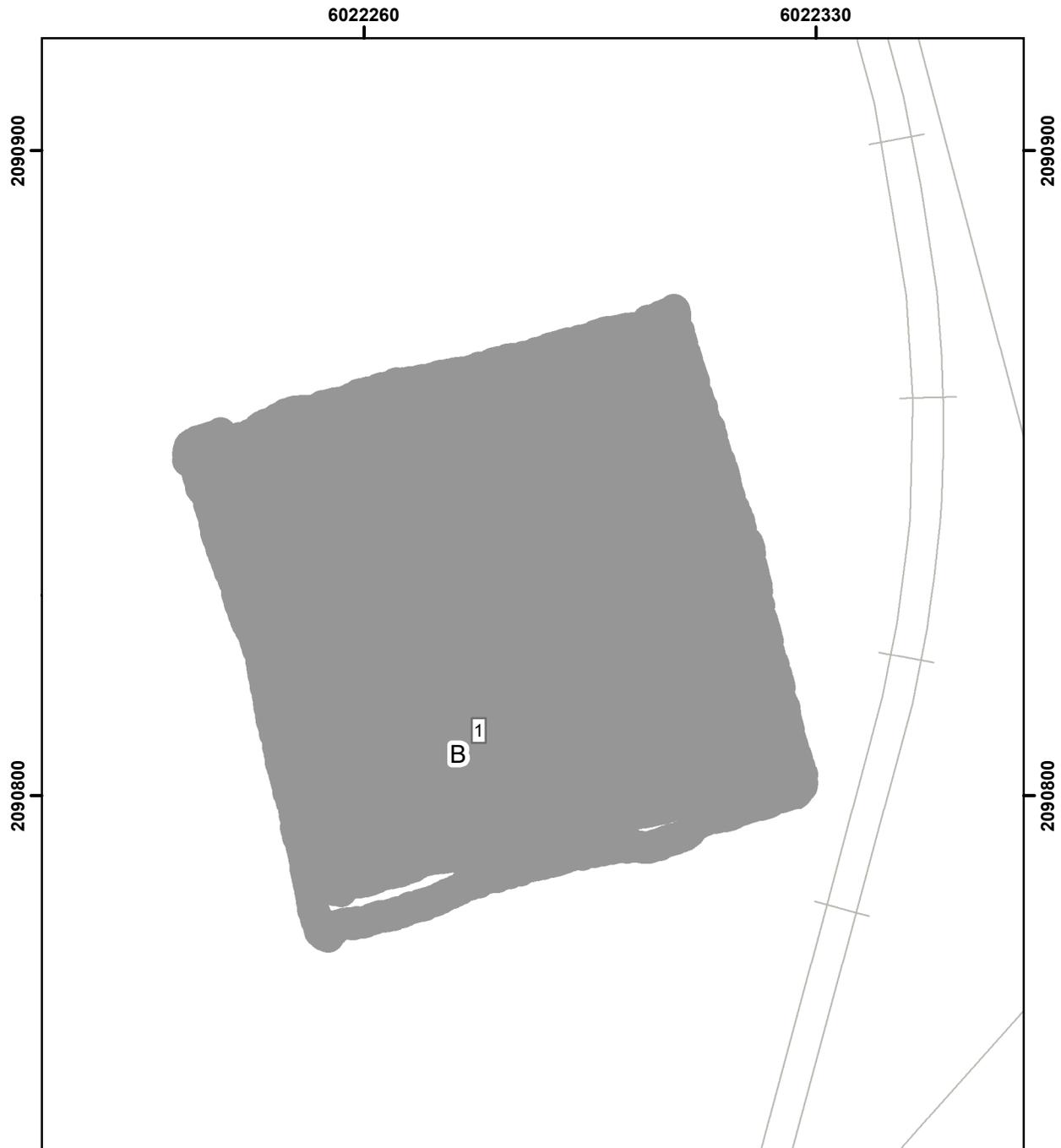
- S Systematic Sample Locations
- RS-700 GWS Coverage

0 10 20 40 Feet

Coordinate system: CSP Zone III, NAD83, US Survey Foot

**Biased Sampling
HPNS Parcel G
RSY 32 Use 1**

TU-153B ESU



RSY 32 Use 1

- B** Biased Sample Location
- RS-700 GWS Coverage

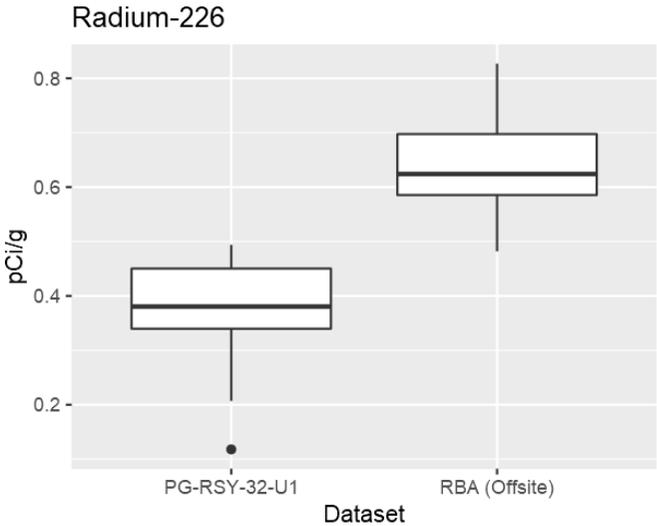
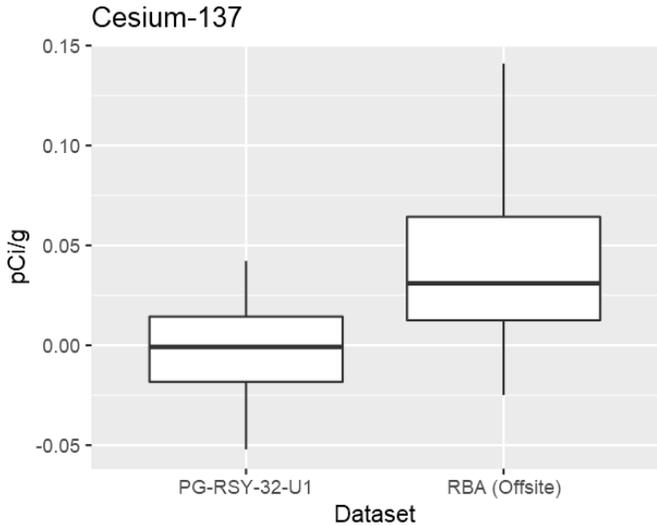
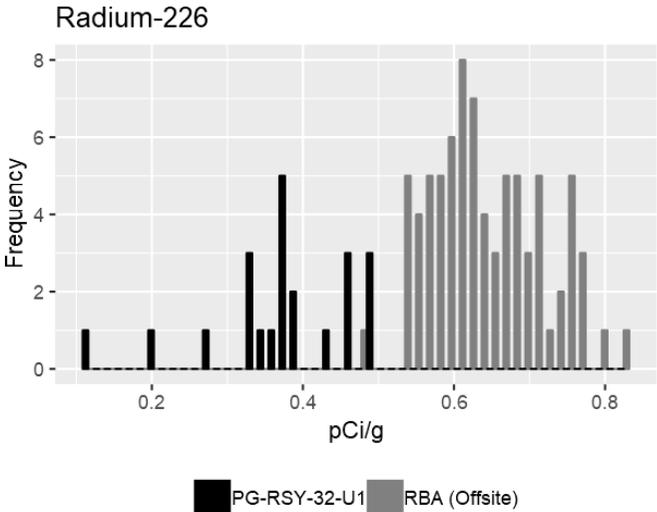
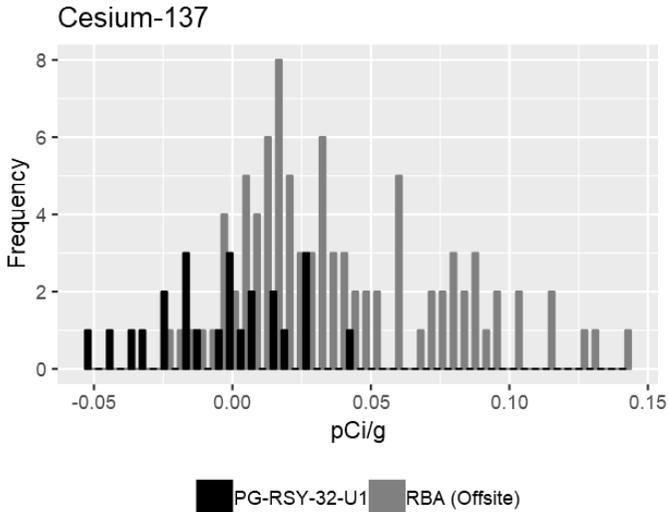
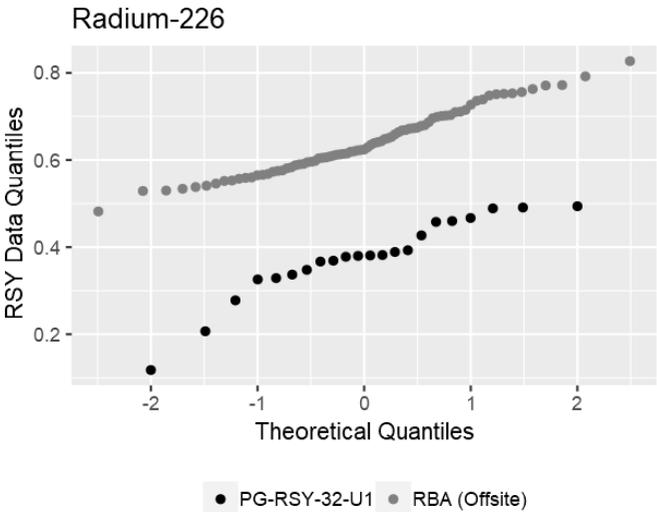
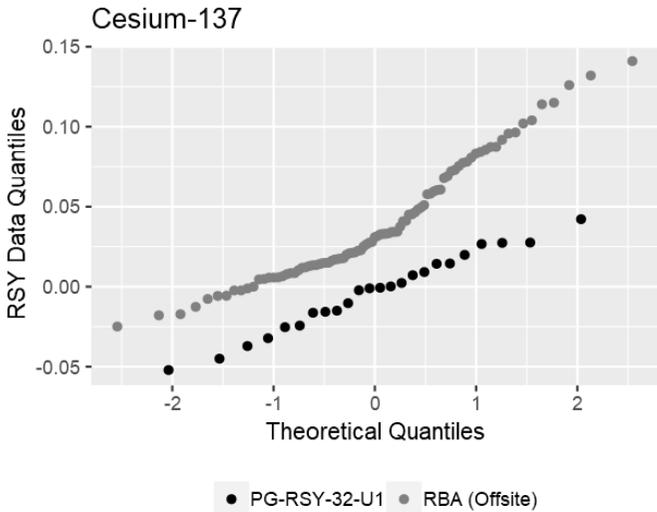
25 12.5 0 25 Feet



Coordinate system: CSP Zone III, NAD83, US Survey Foot



Soil Sample Statistics



WILCOXON RANK SUM TEST

Nuclide: **Rs-226**
 LBGR: **0.378** pCi/g

Location: **RSY 32 Use 1**

DOGL: **1**

LBGR = **0.378**
 Median SU Data
 LBGR = **0.378**

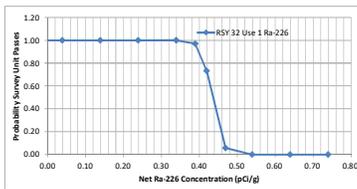
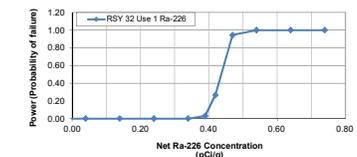
POWER CURVE CALCULATION

Concentration	above Background (C)	(C-LBGR)	SD	p1	p2	E(Wmw)	Var(Wmw)	SD(Wmw)	z	Power	Probability of passing
0.7	-0.16	-5.4	0.00020	0.00001	0.51	3.572099	1.89	860.236	0.00	1.00	1.00
0.8	-0.06	-4.4	0.00234	0.00017	5.8475	57.65651	7.593189	213.416	0.00	1.00	1.00
0.9	0.04	-3.4	0.00666	0.00074	16.66	229.8282	15.16009	106.18	0.00	1.00	1.00
1	0.14	-2.4	0.03855	0.00847	96.375	2238.871	47.31459	32.3363	0.00	1.00	1.00
1.1	0.24	-1.4	0.16116	0.06390	462.748	12005.68	109.5704	11.1673	0.00	1.00	1.00
1.2	0.34	-0.4	0.38865	0.22917	971.623	24617.12	156.8984	4.17297	0.00	1.00	1.00
1.25	0.39	0.1	0.52819	0.36198	1320.47	26144.76	161.6934	1.89179	0.03	0.97	0.97
1.28	0.42	0.4	0.61135	0.45188	1538.30	24617.43	156.8984	0.62446	0.27	0.73	0.73
1.33	0.47	0.9	0.73774	0.60440	1844.35	18976.81	137.7564	-1.5825	0.94	0.06	0.06
1.4	0.54	1.6	0.87105	0.78860	2177.63	9467.028	97.28865	-5.6658	1.00	0.00	0.00
1.5	0.64	2.6	0.96700	0.84062	2417.51	1838.749	42.88064	-18.45	1.00	0.00	0.00
1.6	0.74	3.6	0.99334	0.89741	2483.34	229.8282	15.16009	-56.529	1.00	0.00	0.00

DATA	AREA	ADJUSTED DATA	RANKS	SURVEY UNIT RANKS	Sorted Ranks	Location Associated with Sorted Rank
0.59	R	0.588	48.5	0	1.5	S
0.69	R	0.687	101	0	1.5	S
0.57	R	0.566	40	0	3	S
0.64	R	0.635	78.5	0	4	S
0.61	R	0.606	58	0	5	S
0.65	R	0.653	87.5	0	6	S
0.61	R	0.613	62	0	7	S
0.71	R	0.711	109	0	8	S
0.68	R	0.68	99.5	0	10	S
0.61	R	0.608	59	0	10	S
0.54	R	0.541	31	0	10	S
0.59	R	0.588	48.5	0	12	S
0.67	R	0.673	96	0	13	S
0.67	R	0.674	97	0	14	S
0.48	R	0.482	26	0	15	S
0.76	R	0.763	121	0	16	S
0.75	R	0.748	115	0	17	S
0.56	R	0.56	37.5	0	18	S
0.61	R	0.614	64	0	19	S
0.53	R	0.529	27	0	20	S
0.61	R	0.605	57	0	21	S
0.58	R	0.575	44	0	22	S
0.67	R	0.672	95	0	23	S
0.56	R	0.559	38	0	23	S
0.68	R	0.664	90.5	0	25	S
0.55	R	0.546	32	0	26	R
0.74	R	0.739	114	0	27	R
0.74	R	0.736	113	0	28	R
0.60	R	0.604	56	0	29	R
0.70	R	0.701	105	0	30	R
0.59	R	0.589	104	0	31	R
0.70	R	0.699	104	0	32	R
0.62	R	0.624	73.5	0	33	R
0.58	R	0.583	43	0	34	R
0.57	R	0.573	43	0	35	R
0.62	R	0.623	71	0	36	R
0.60	R	0.598	55	0	37.5	R
0.64	R	0.643	84	0	37.5	R
0.55	R	0.553	34	0	39	R
0.75	R	0.751	116.5	0	40	R
0.77	R	0.771	122	0	41.5	R
0.72	R	0.715	110.5	0	41.5	R
0.62	R	0.62	68	0	43	R
0.71	R	0.71	108	0	44	R
0.58	R	0.581	46	0	45	R
0.60	R	0.595	53	0	46	R
0.58	R	0.58	37.5	0	47	R
0.75	R	0.751	116.5	0	48.5	R
0.67	R	0.669	93.5	0	48.5	R
0.62	R	0.619	67.5	0	49.5	R
0.64	R	0.641	82.5	0	50.5	R
0.59	R	0.59	50.5	0	52	R
0.61	R	0.614	64	0	53	R
0.65	R	0.653	87.5	0	54	R
0.58	R	0.576	45	0	55	R
0.62	R	0.622	69.5	0	56	R
0.57	R	0.565	39	0	57	R
0.63	R	0.629	76.5	0	58	R
0.64	R	0.641	82.5	0	59	R
0.61	R	0.614	64	0	60	R
0.66	R	0.664	90.5	0	61	R
0.77	R	0.772	123	0	62	R
0.64	R	0.639	80.5	0	64	R
0.62	R	0.624	73.5	0	64	R
0.61	R	0.612	61	0	64	R
0.65	R	0.648	85	0	66	R
0.55	R	0.552	33	0	67	R
0.62	R	0.624	73.5	0	68	R
0.62	R	0.616	69.5	0	69.5	R
0.64	R	0.635	78.5	0	69.5	R
0.70	R	0.703	107	0	71	R
0.53	R	0.53	29	0	73.5	R
0.73	R	0.727	112	0	73.5	R
0.62	R	0.624	73.5	0	73.5	R
0.65	R	0.65	80.5	0	75	R
0.67	R	0.668	92	0	76.5	R
0.54	R	0.538	30	0	76.5	R
0.57	R	0.568	41.5	0	76.5	R
0.60	R	0.596	54	0	76.5	R
0.59	R	0.591	52	0	80.5	R
0.68	R	0.678	98	0	80.5	R
0.67	R	0.669	93.5	0	82.5	R
0.79	R	0.792	124	0	82.5	R
0.75	R	0.752	118	0	84	R
0.56	R	0.557	35	0	85	R
0.62	R	0.622	69.5	0	86	R
0.70	R	0.702	106	0	87.5	R
0.64	R	0.639	80.5	0	87.5	R
0.76	R	0.756	120	0	89	R
0.70	R	0.696	102.5	0	90.5	R
0.72	R	0.715	110.5	0	90.5	R
0.66	R	0.659	89	0	92	R
0.70	R	0.696	102.5	0	93.5	R
0.63	R	0.629	76.5	0	93.5	R
0.68	R	0.68	99.5	0	95	R
0.53	R	0.534	29	0	96	R
0.61	R	0.61	60	0	97	R
0.83	R	0.827	125	0	98	R
0.75	R	0.753	119	0	99.5	R
0.57	R	0.568	41.5	0	99.5	R
0.367	S	-0.011	10	10	101	R
0.48	S	0.082	21	21	102.5	R
0.491	S	0.113	24	24	102.5	R
0.427	S	0.049	19	19	104	R
0.118	S	-0.26	1.5	1.5	105	R
0.381	S	0.003	15	15	106	R
0.382	S	0.004	16	16	107	R
0.389	S	0.011	17	17	108	R
0.378	S	0	13	13	109	R
0.367	S	-0.011	10	10	110.5	R
0.38	S	0.002	14	14	110.5	R
0.367	S	-0.011	10	10	112	R
0.489	S	0.111	23	23	113	R
0.329	S	-0.049	6	6	114	R
0.297	S	-0.171	3	3	115	R
0.467	S	0.089	22	22	116.5	R
0.393	S	0.015	18	18	116.5	R
0.328	S	-0.052	5	5	118	R
0.369	S	-0.009	12	12	119	R
0.278	S	-0.1	4	4	120	R
0.337	S	-0.041	7	7	121	R
0.118	S	-0.26	1.5	1.5	122	R
0.468	S	0.08	20	20	123	R
0.348	S	0.03	8	8	124	R
0.484	S	0.116	25	25	125	R
Sum =			7876	325		

Count	SU Stats	m
25	0.100	
3	0.378	
1		
100		n
0.073		
1951.9		

Number of Samples	LBGR	Actual N
0.100	0.378	25.23
6.21		
1		
13		
25		
0.100		
2.326		
1.645		



QUANTILE TEST

From NUREG 1505, Table A.7b Values of α and k for the Quantile Test When α is Approximately 0.025

Use:	m	n	k	alpha
25	100	100	4	0.025
100	25	25	3	0.025

If k or more of the r largest measurements in the combined ranked data set are from the survey unit, the null hypothesis of the Quantile test (that there is no residual radioactivity above the LBGR in any part of the survey unit) is rejected.

0 of the largest 4 adjusted measurements are from S. The null hypothesis is accepted.

# of R:	# of S:	n	m
100	25	100	25
73.5	13	73.5	13

For m or n greater than 20, the critical value (k) can be calculated from

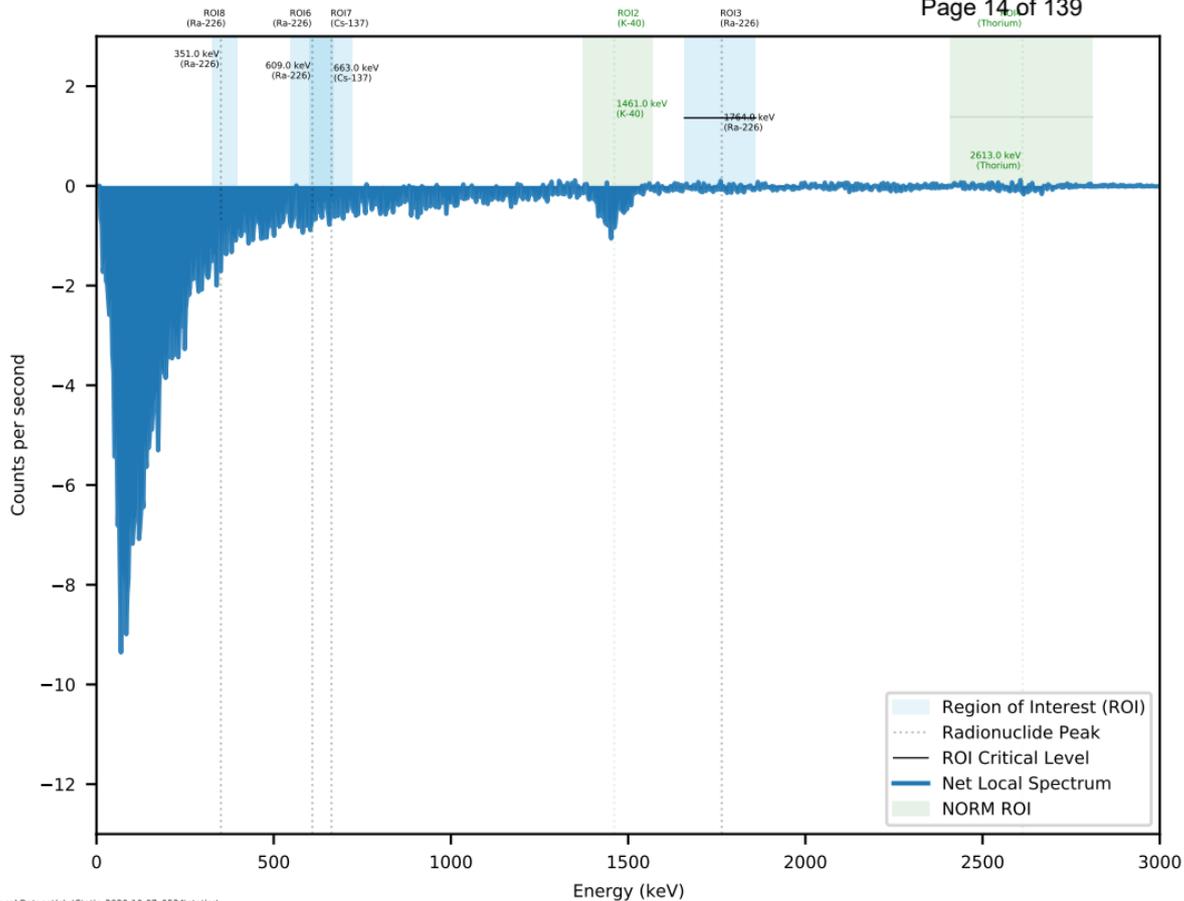
$$\frac{m(n+m+1)}{2} + z \sqrt{\frac{nm(n+m+1)}{12}}$$

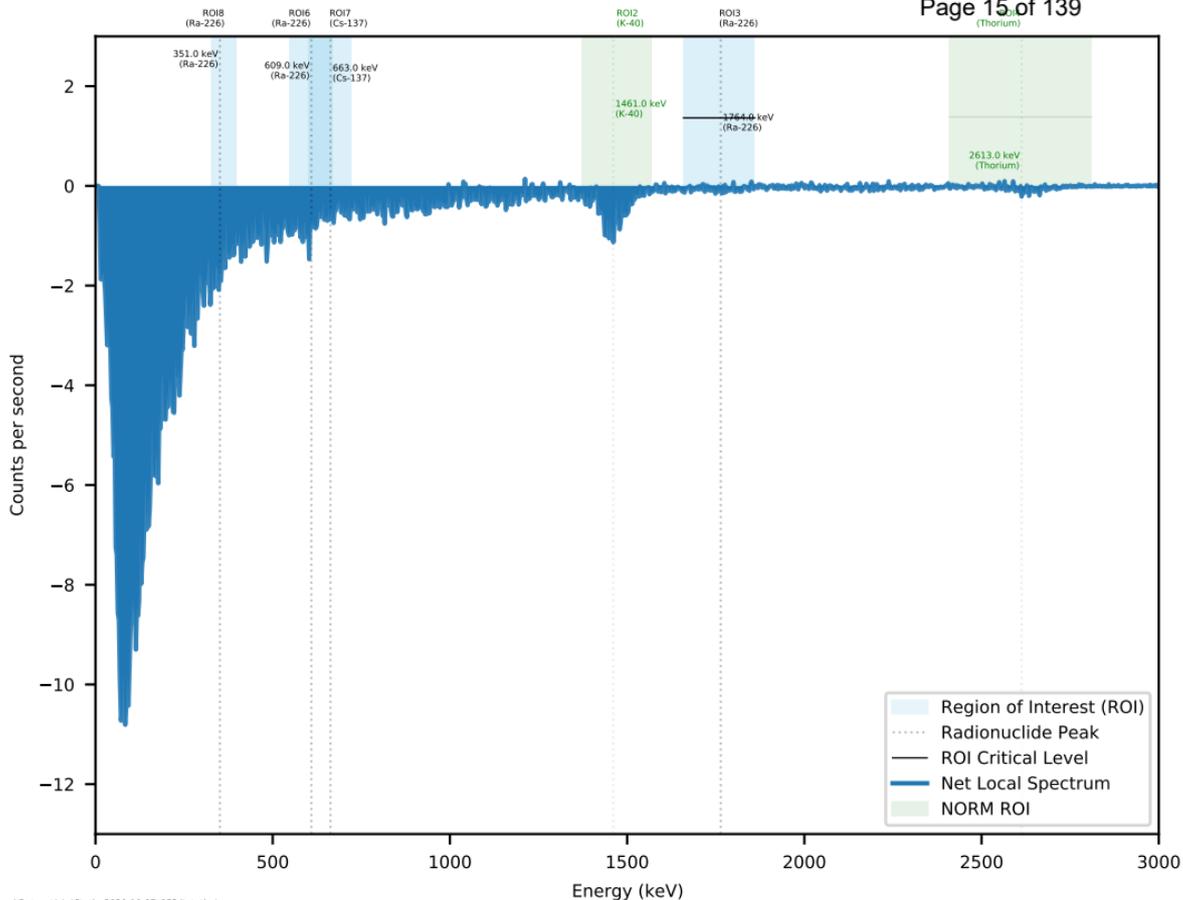
$z = 99.0\%$ percentile of standard normal distribution = 2

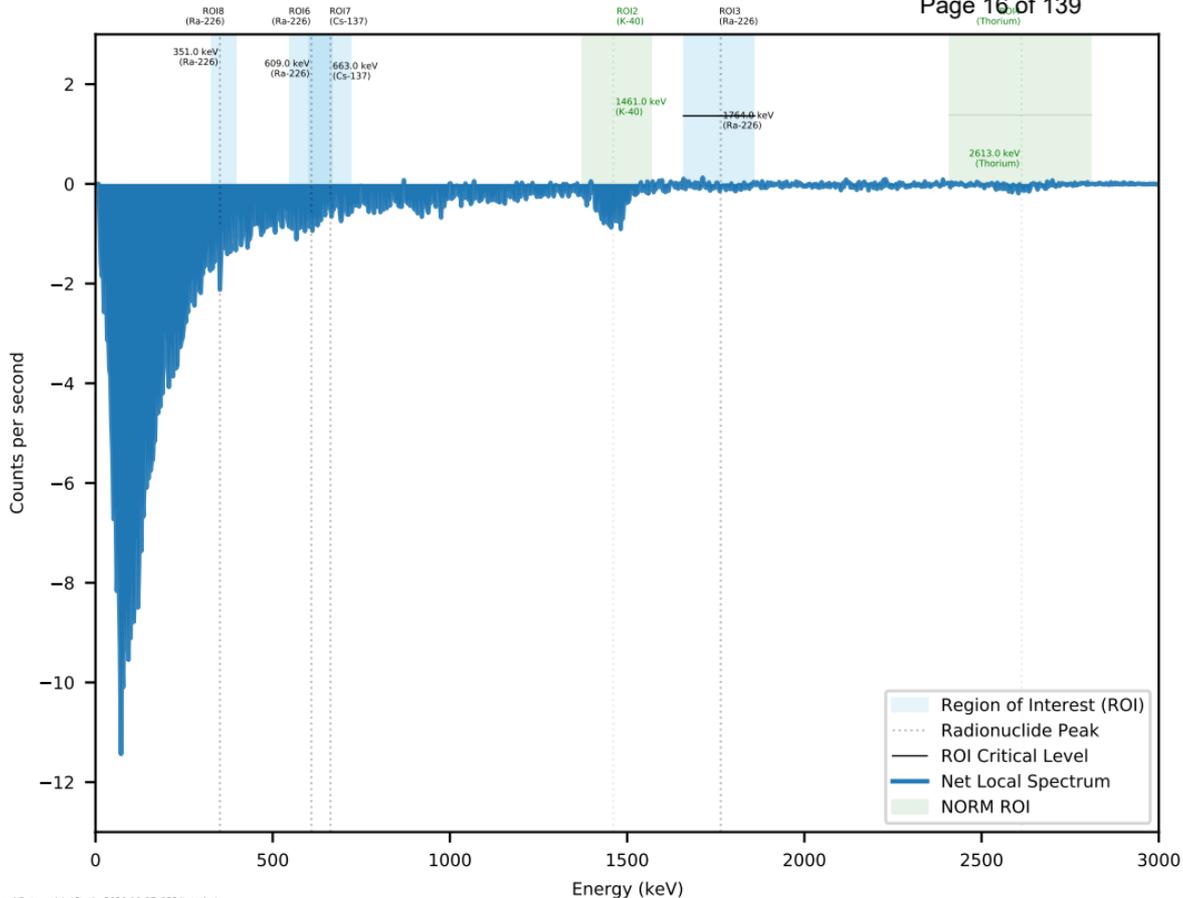
$k = 1951.9$

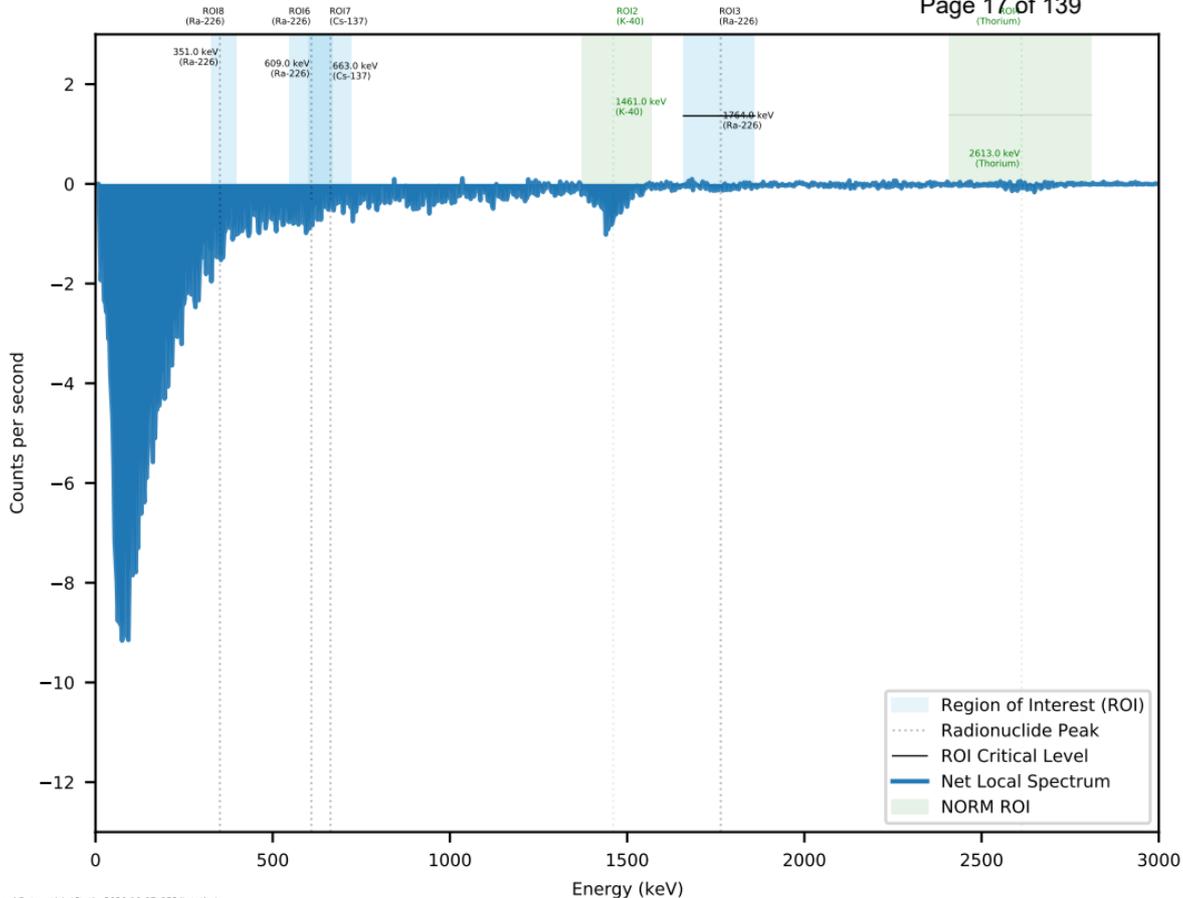
$\alpha = 0.02 = 0.01$
 $\beta = 0.05$

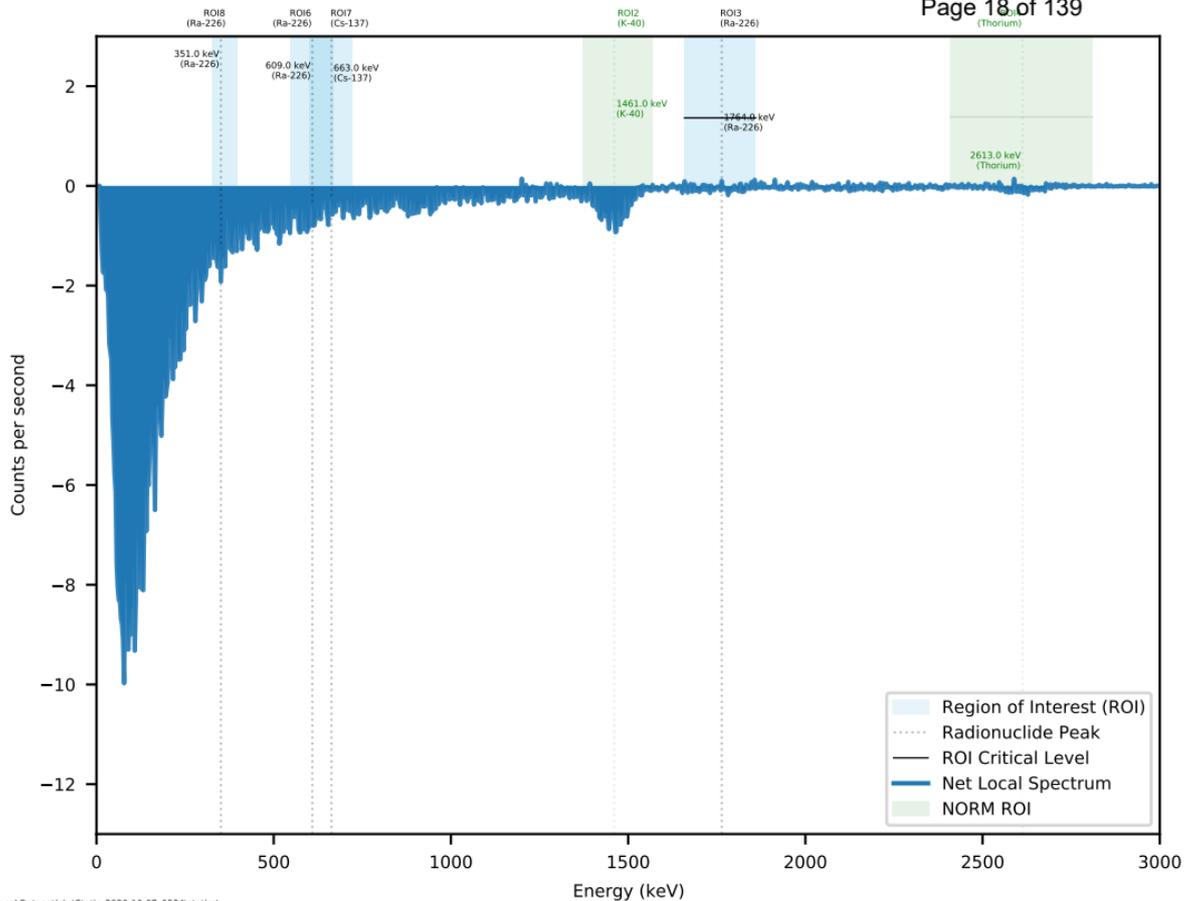
Since the sum of the survey unit ranks is less than the critical value, the null hypothesis that the survey unit concentrations do not exceed the LBGR is accepted (i.e., survey unit passes).

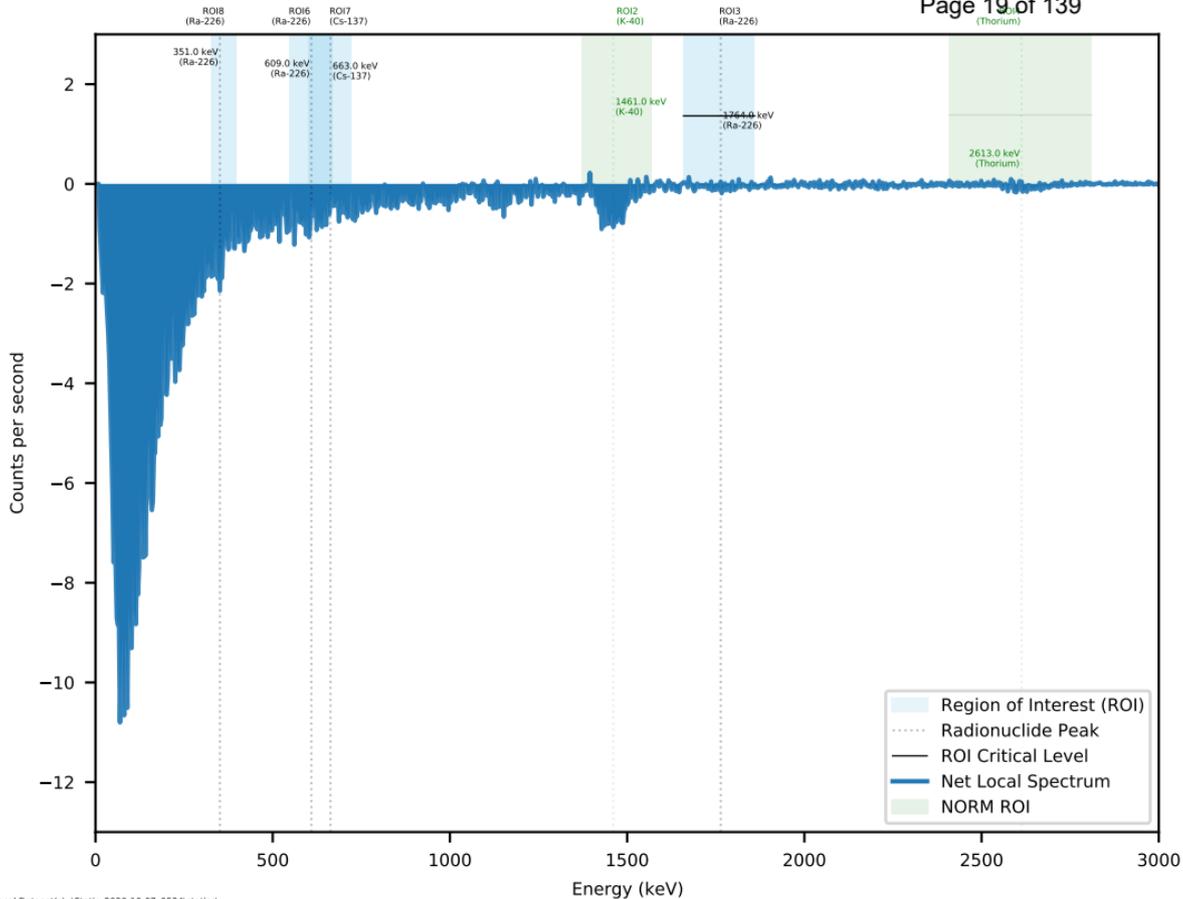


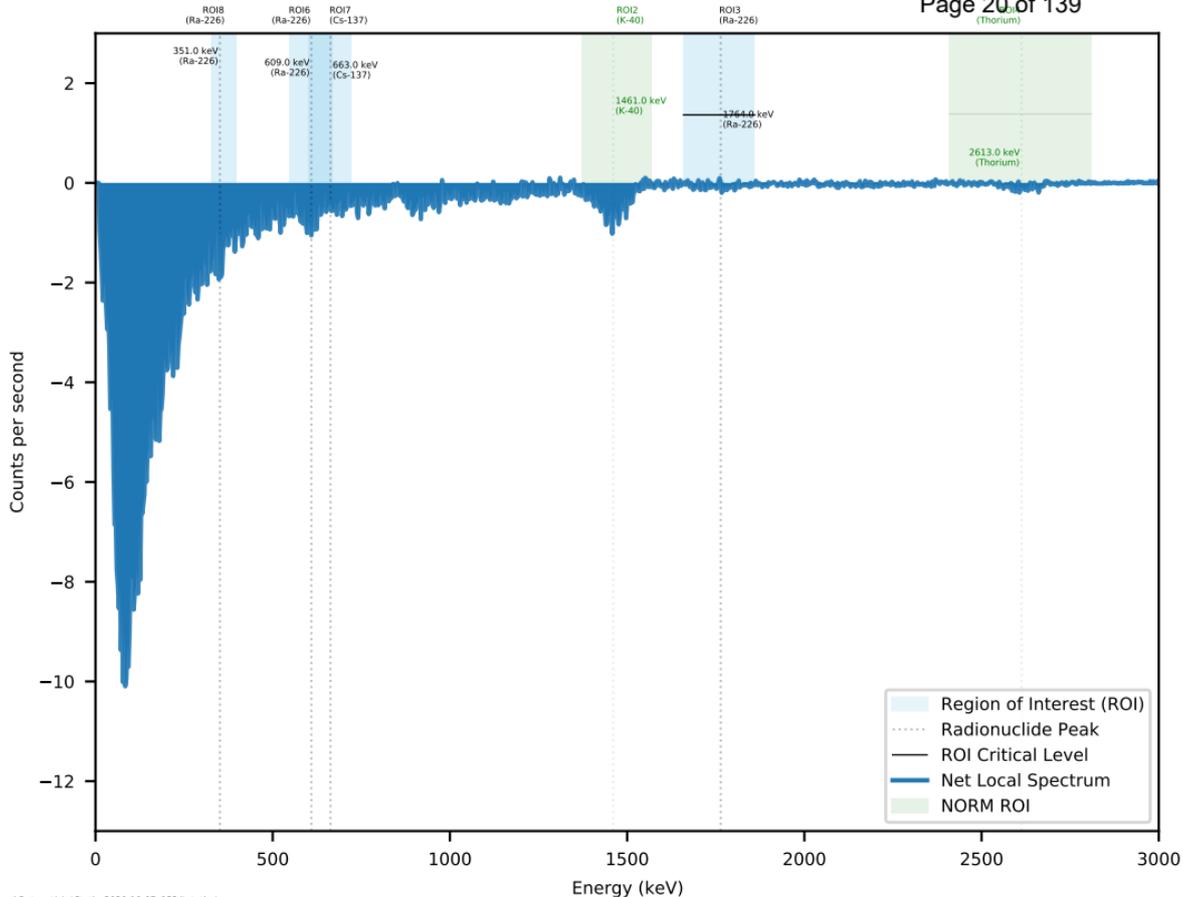


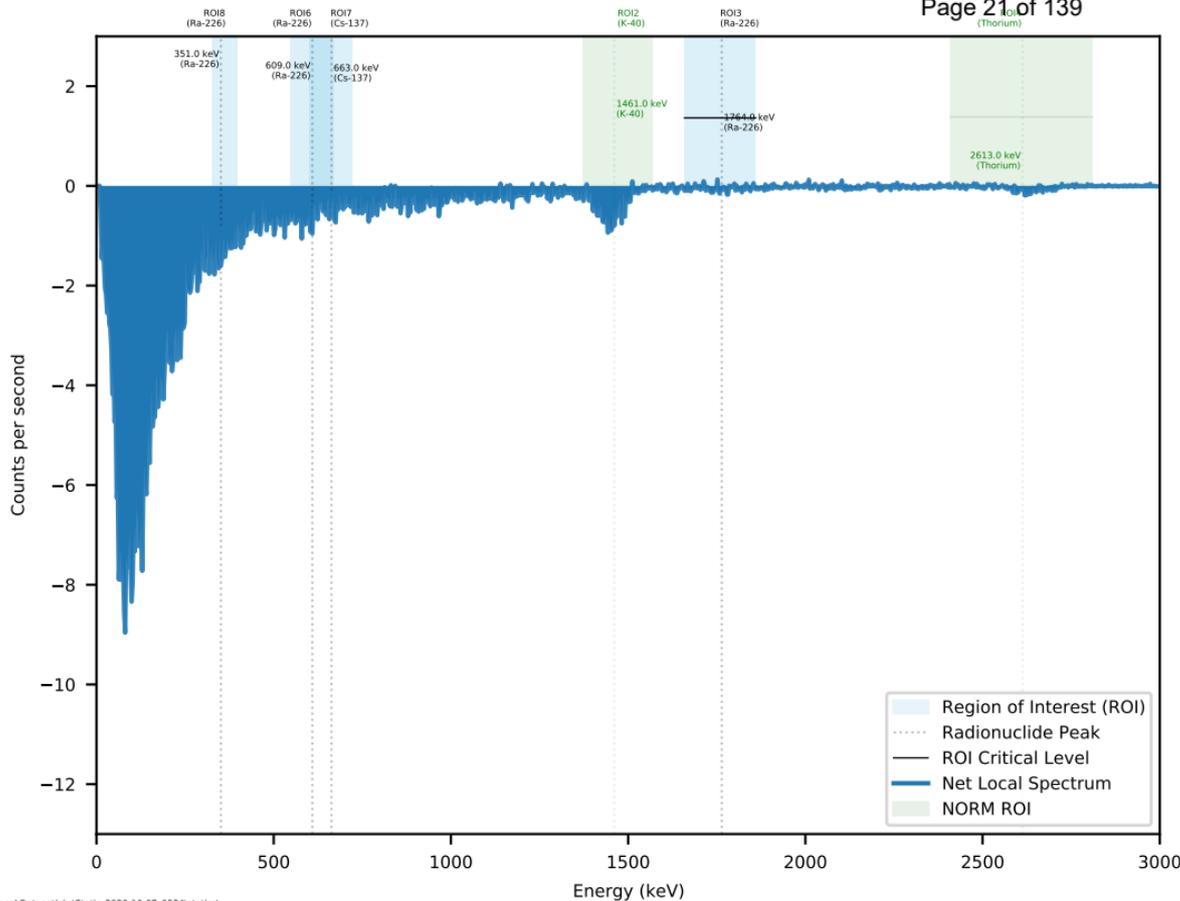


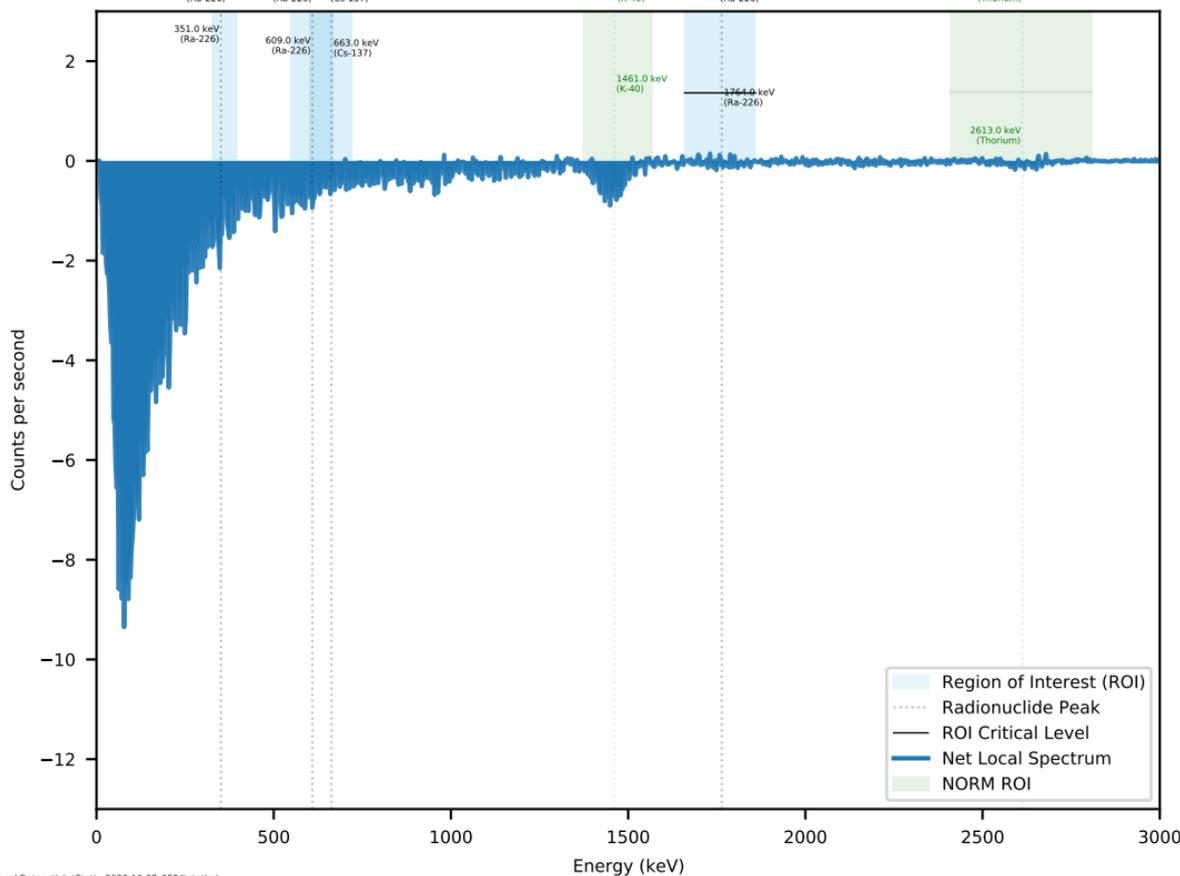


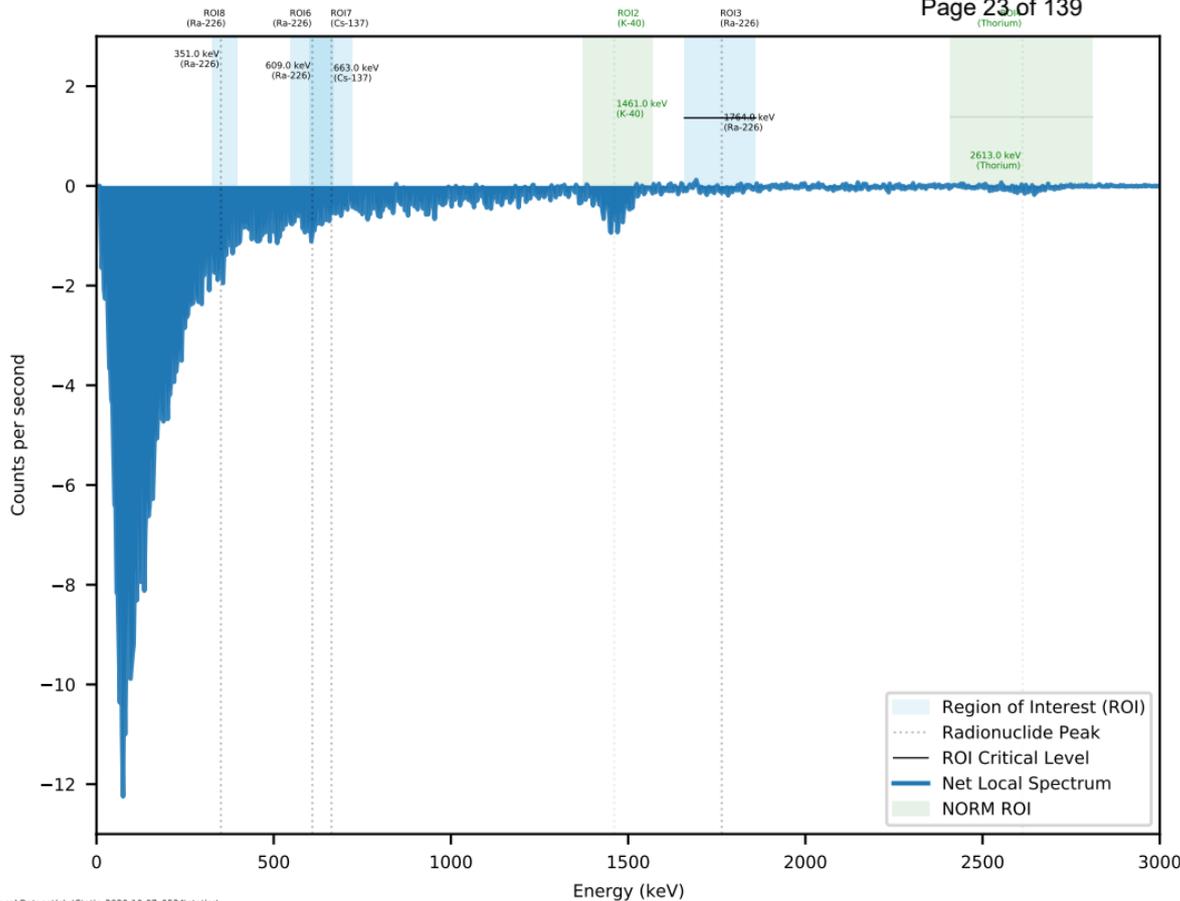


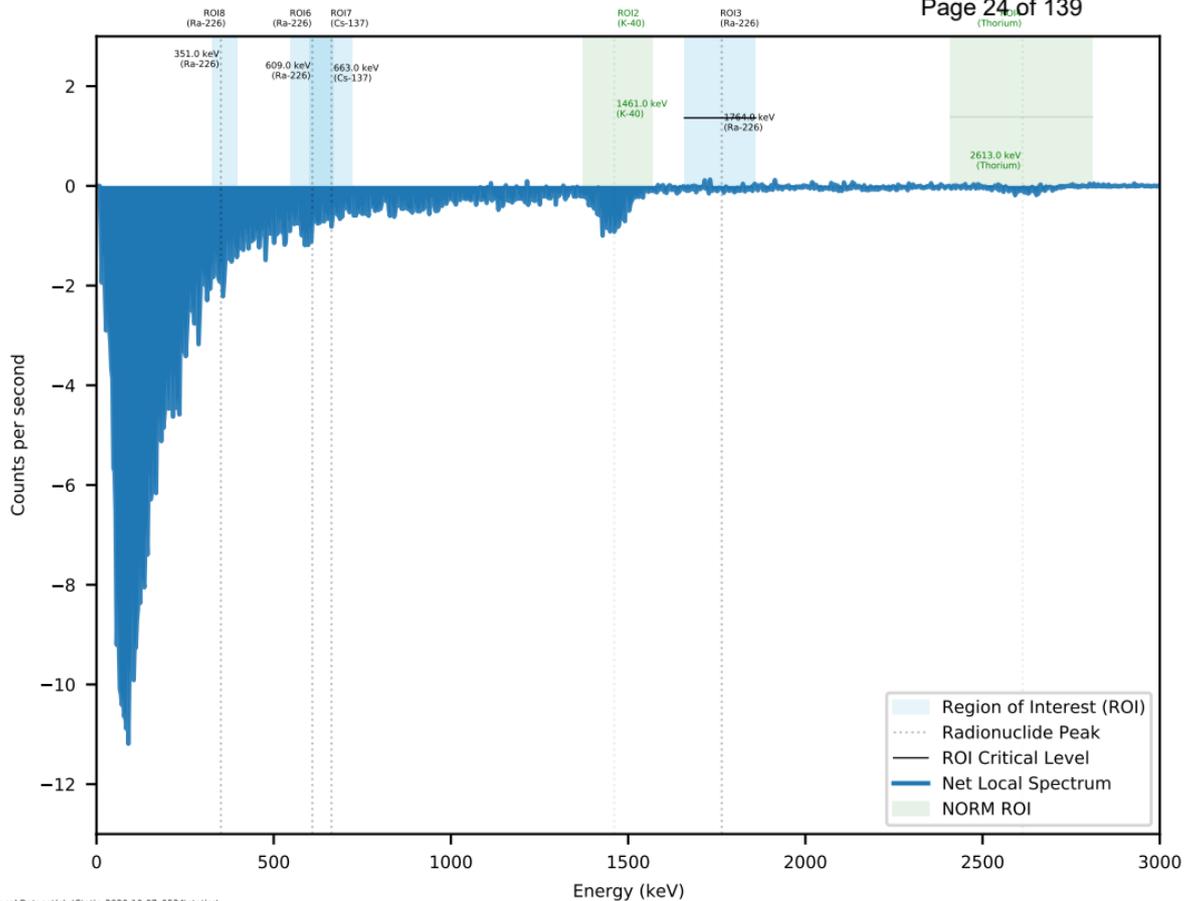


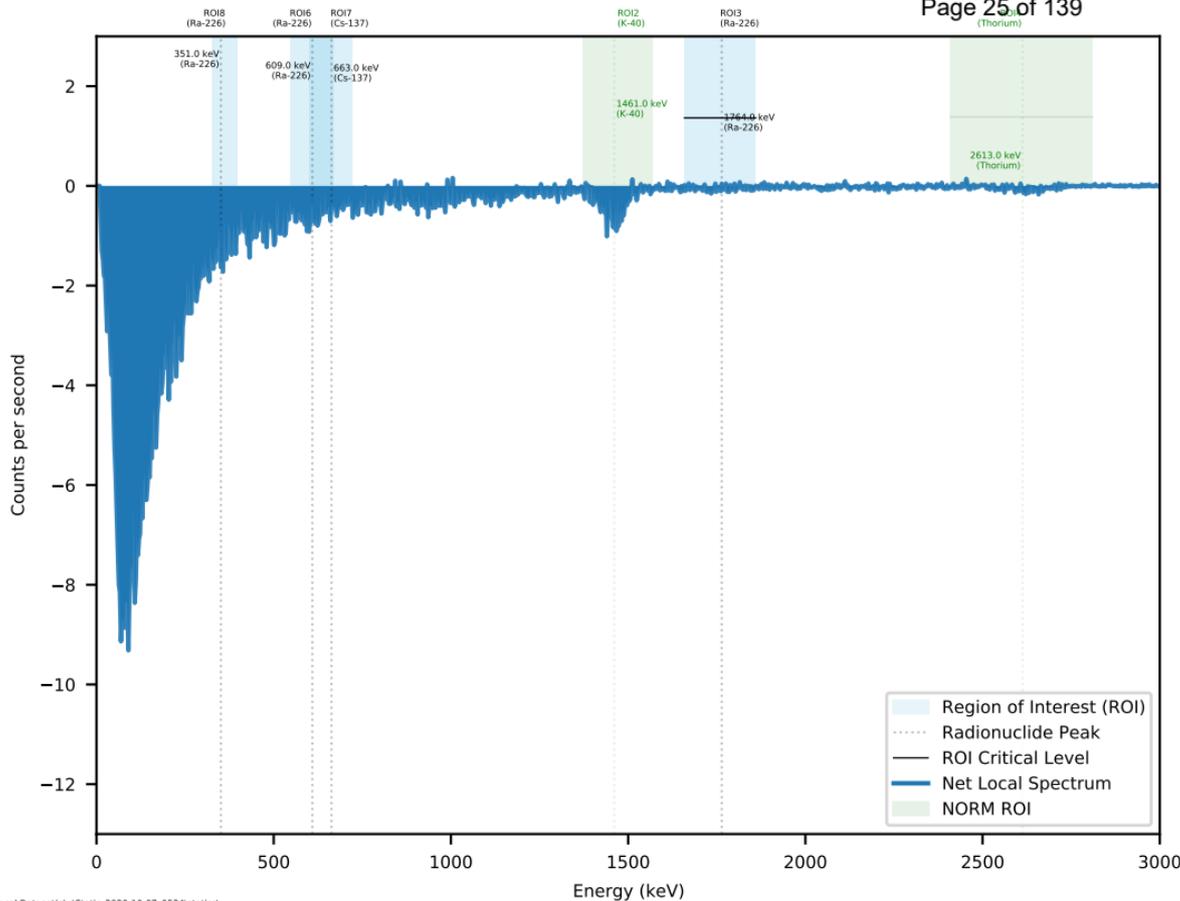


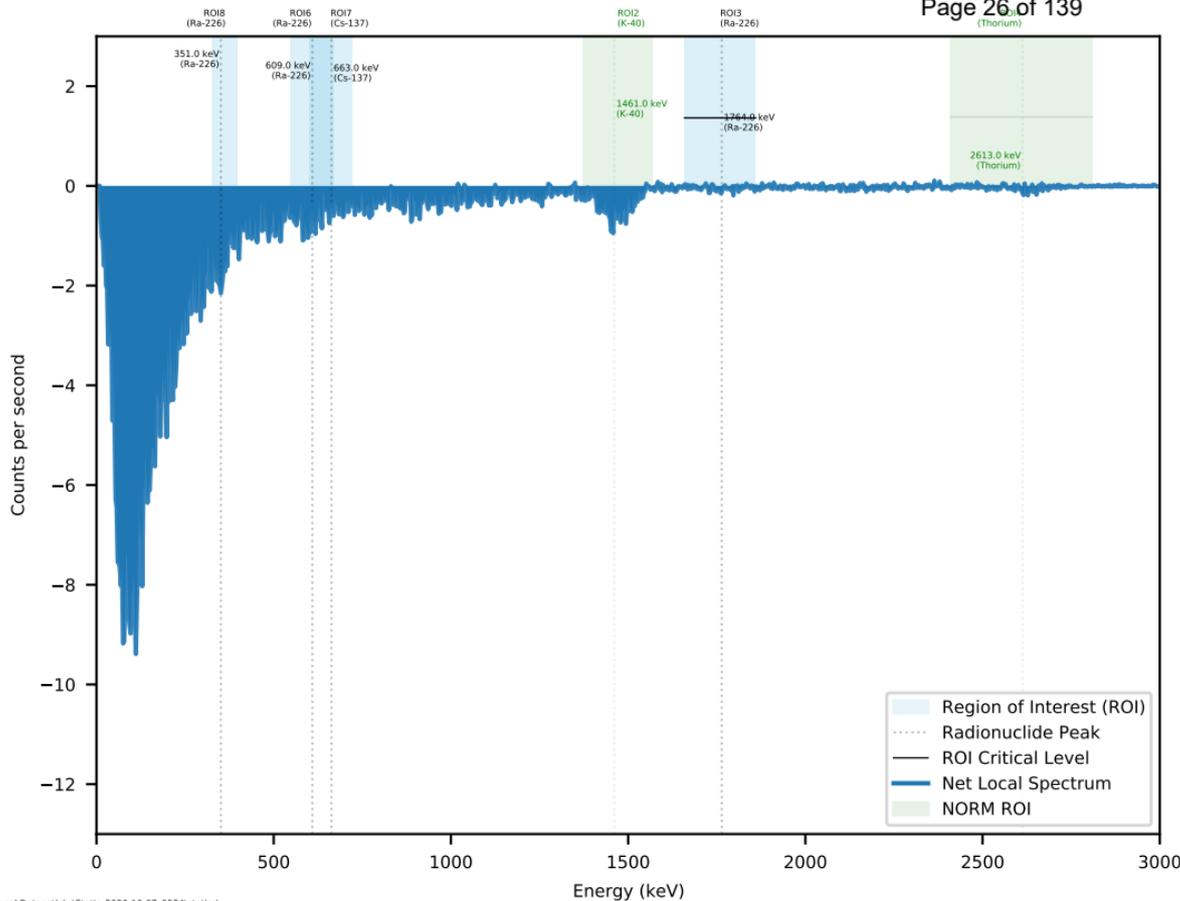


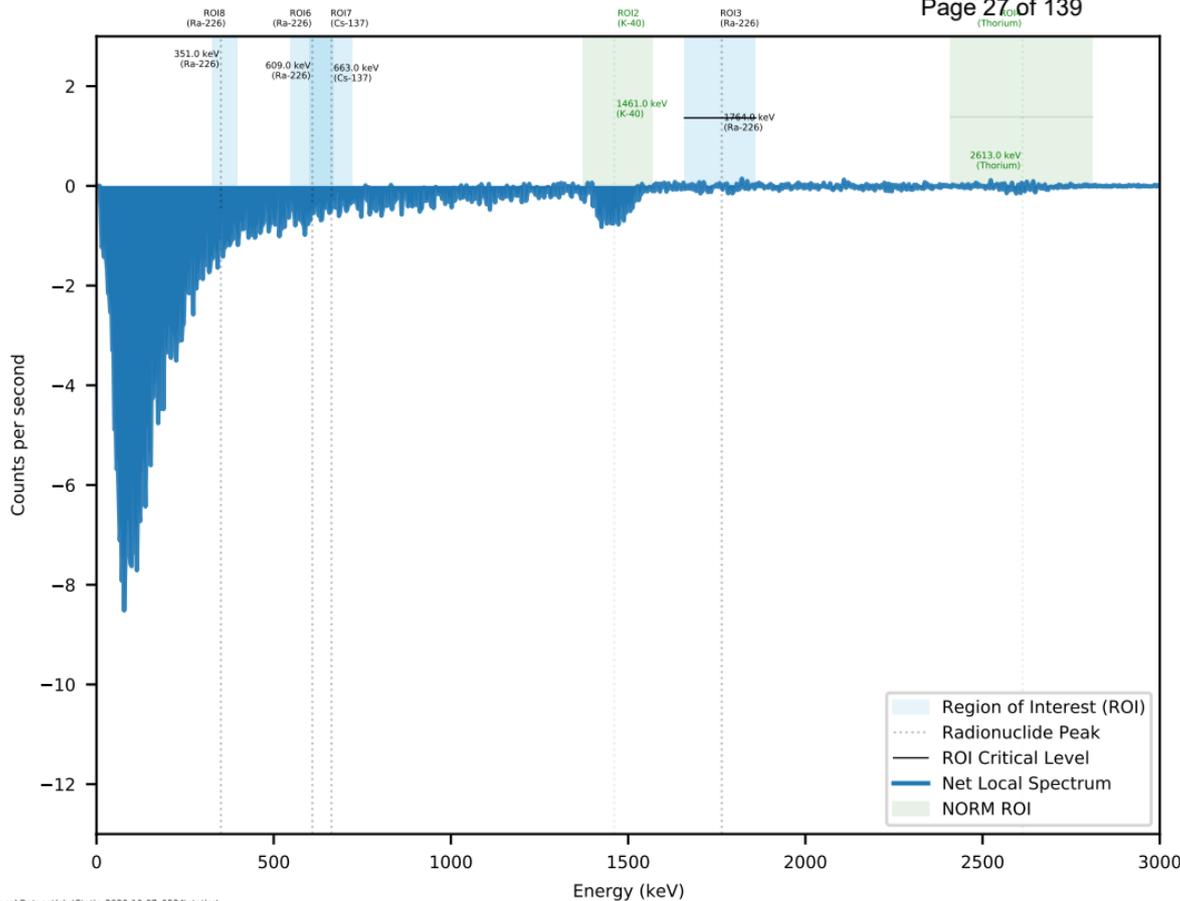


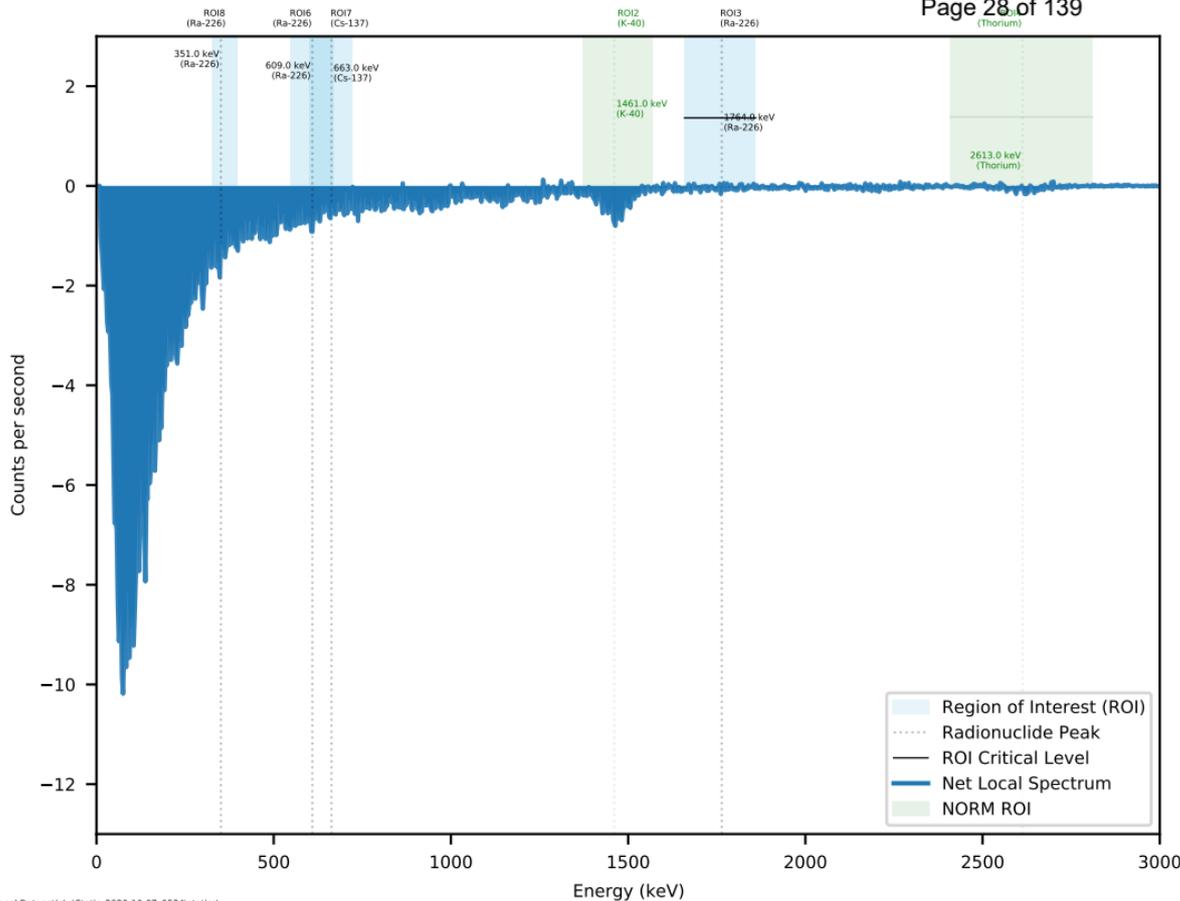


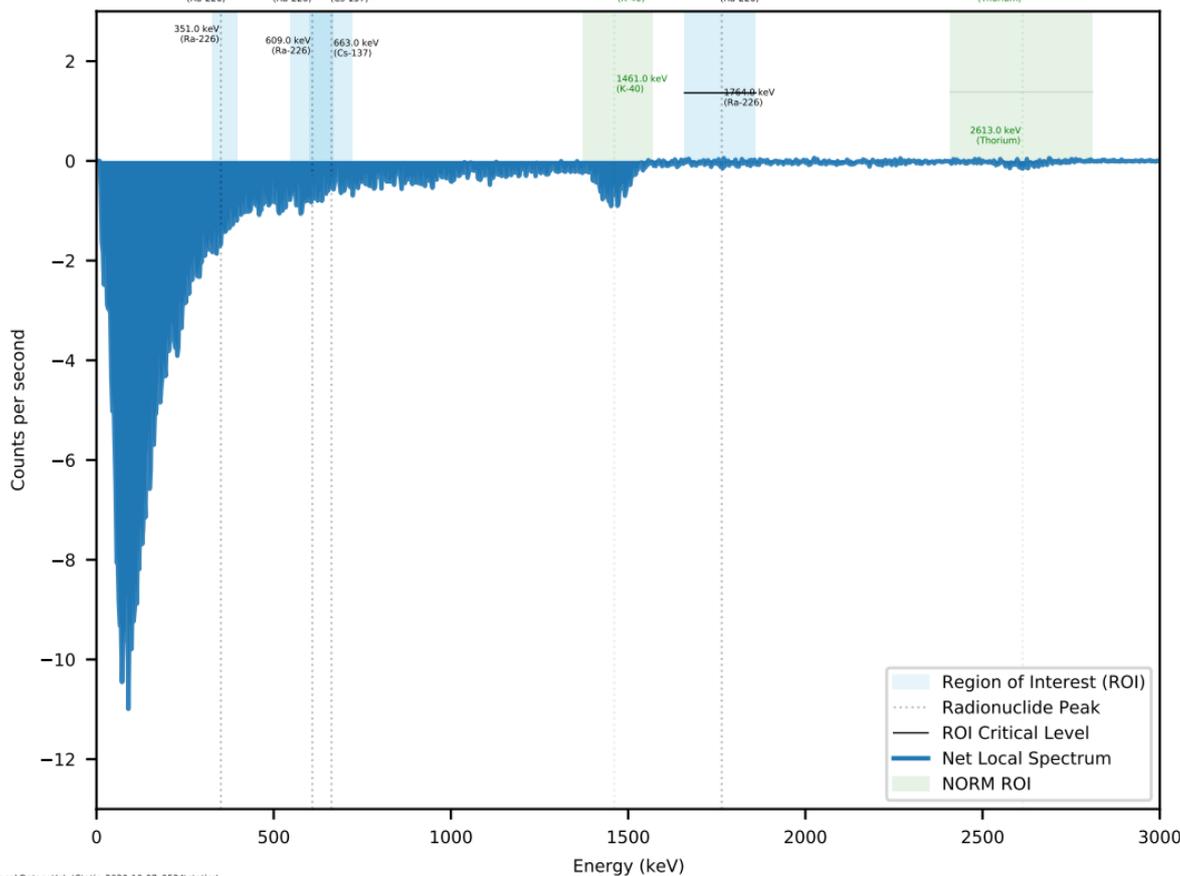


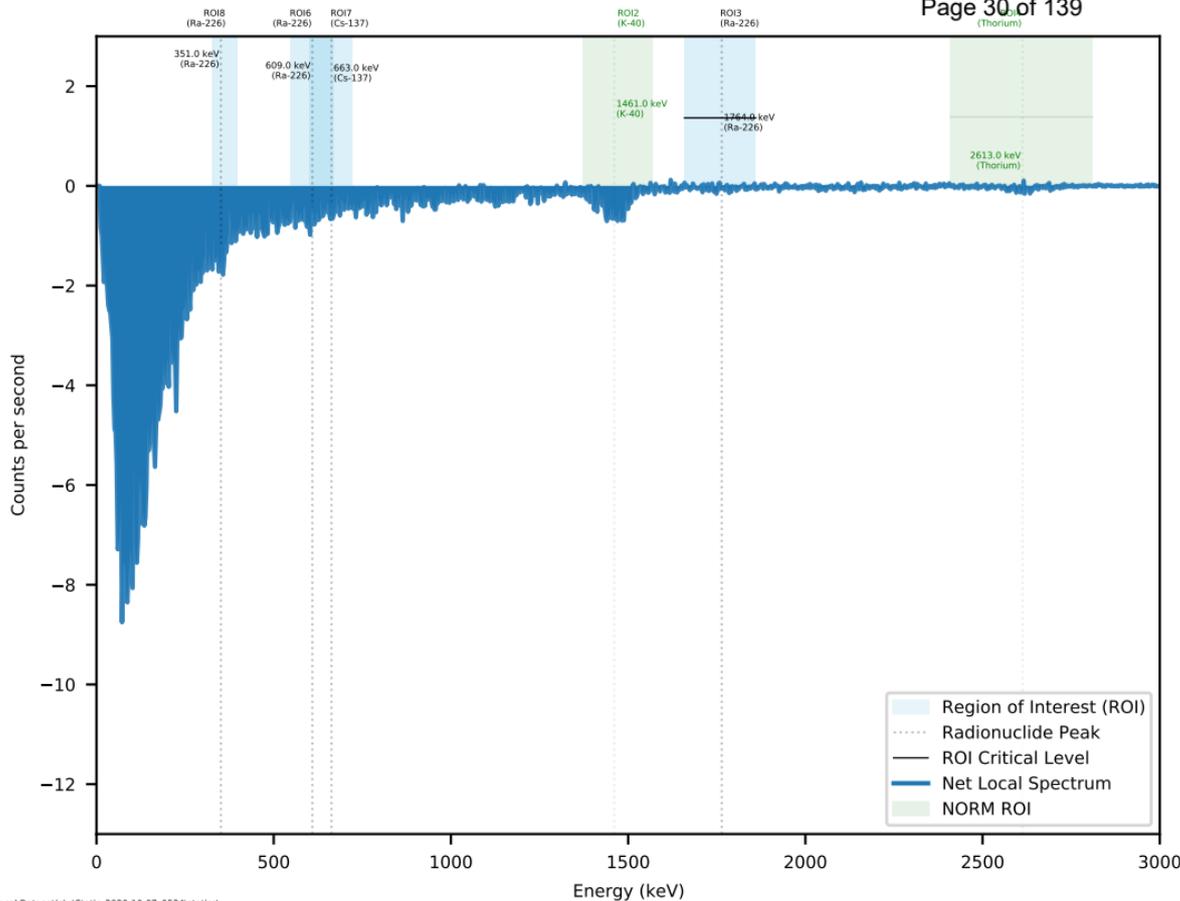


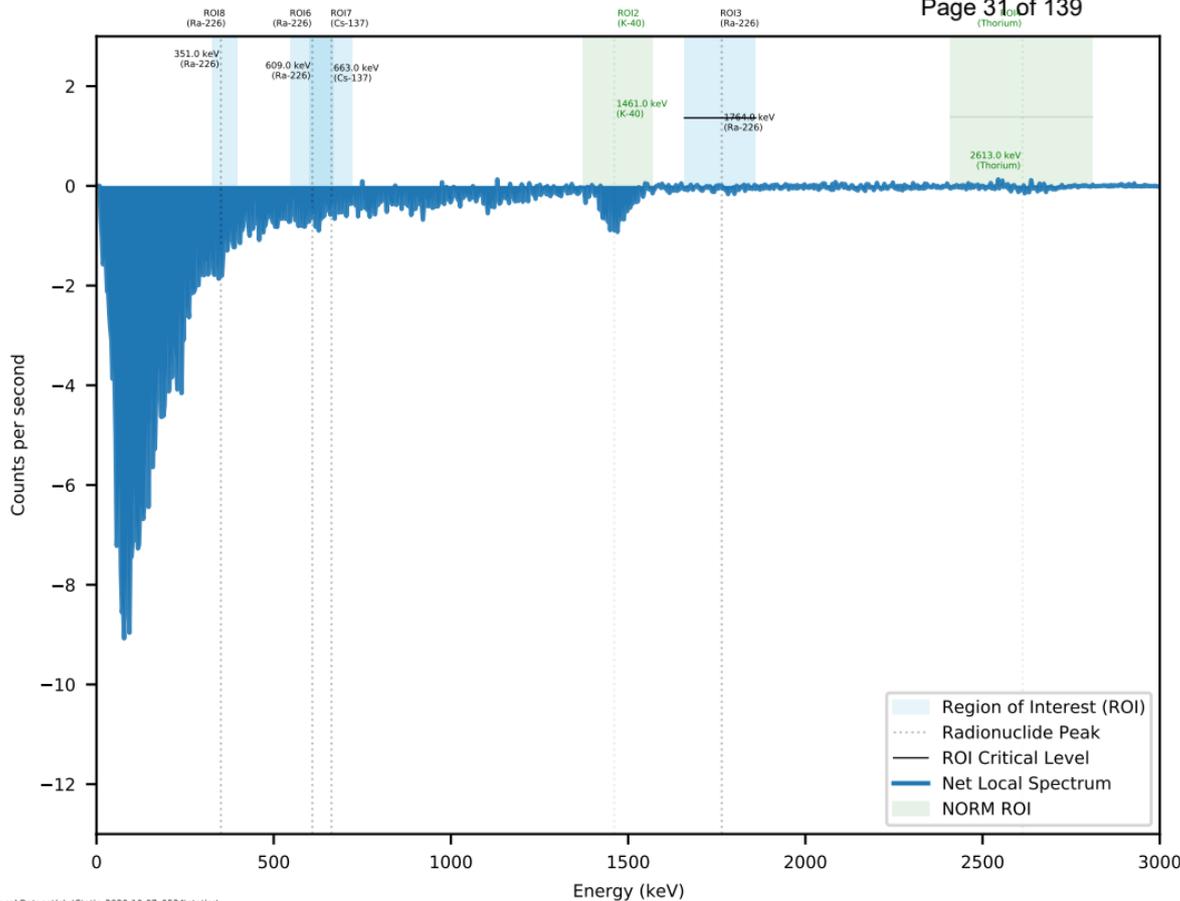


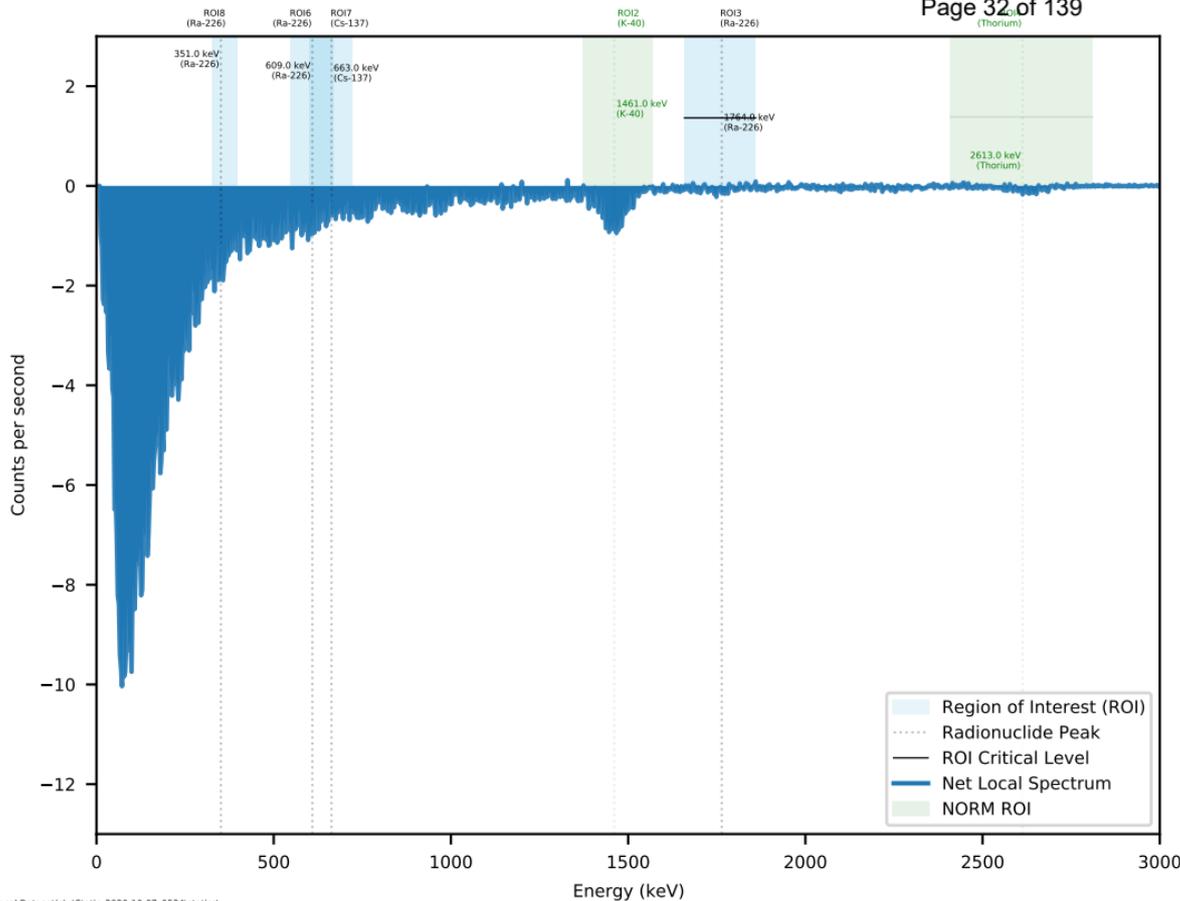


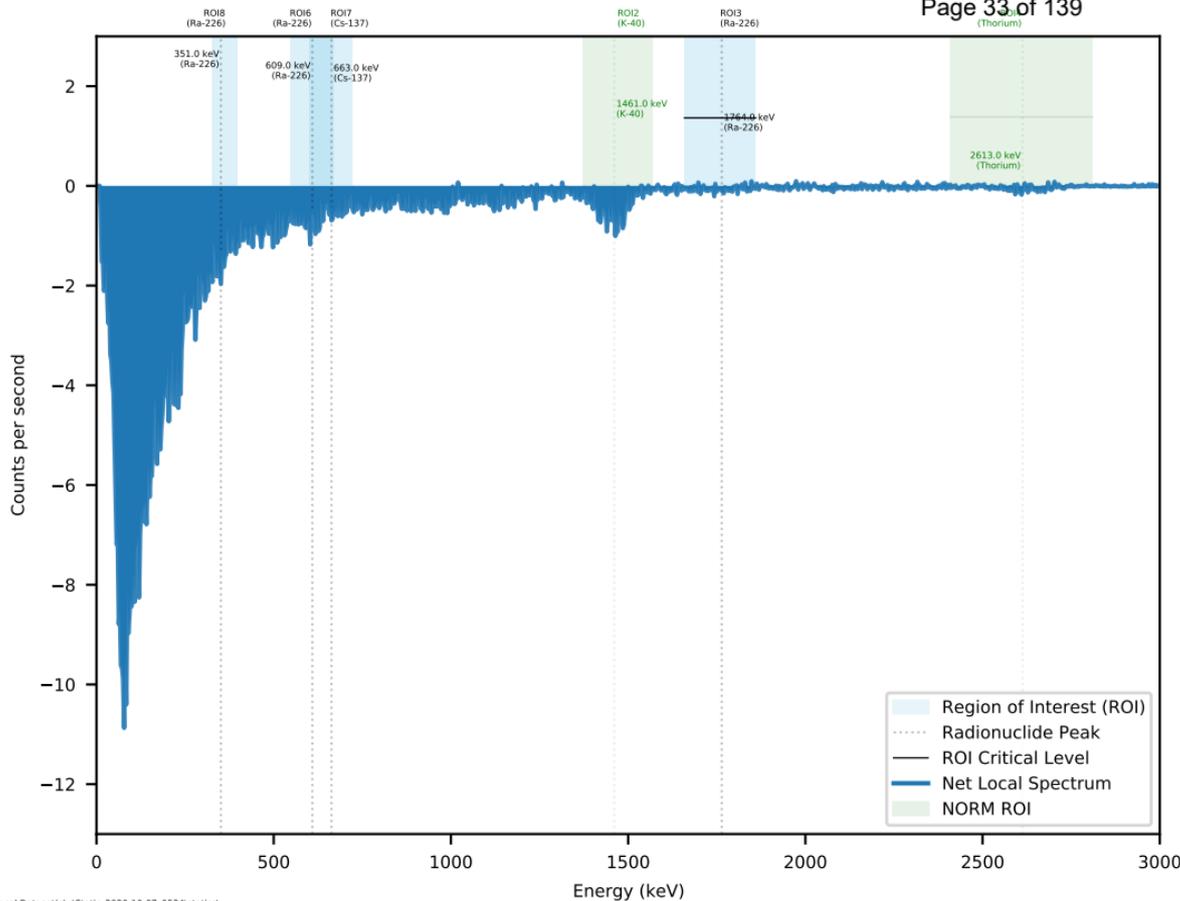


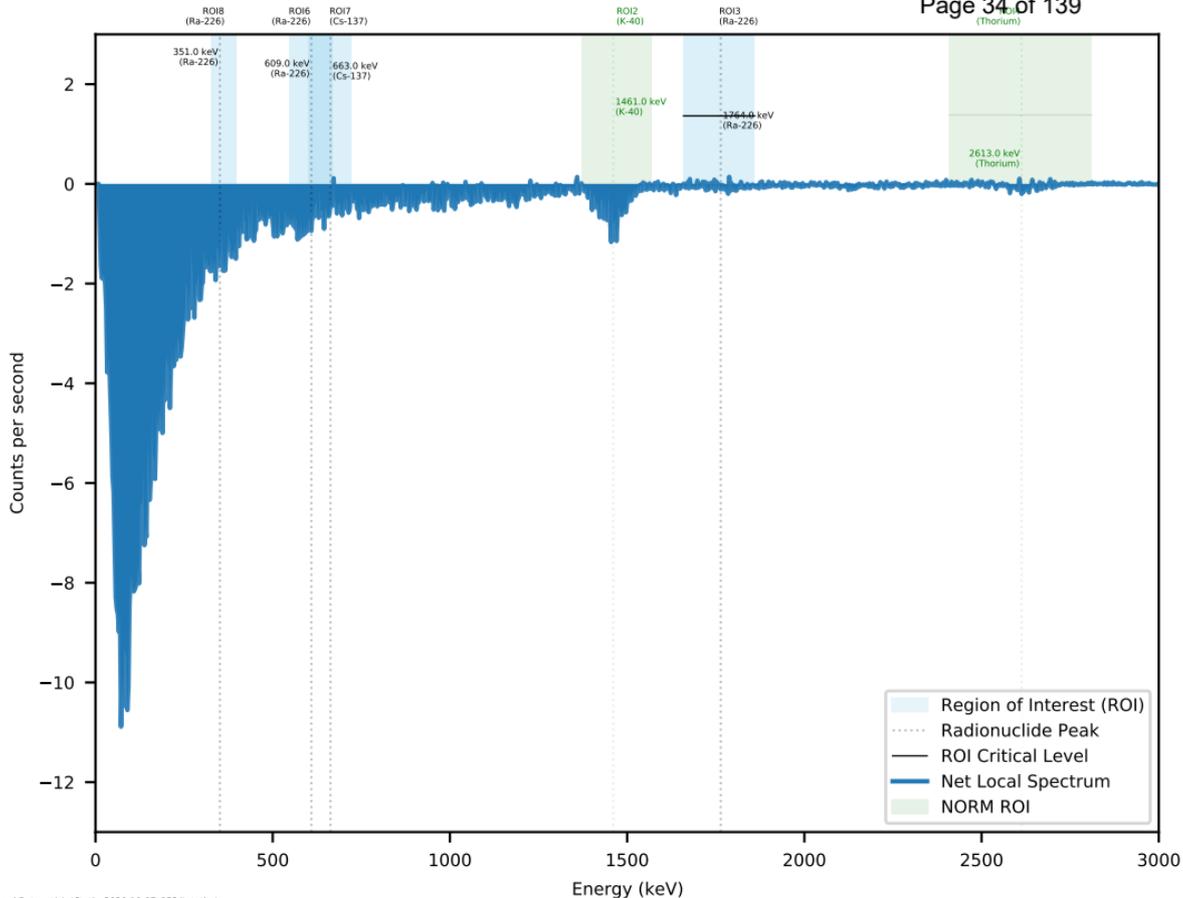


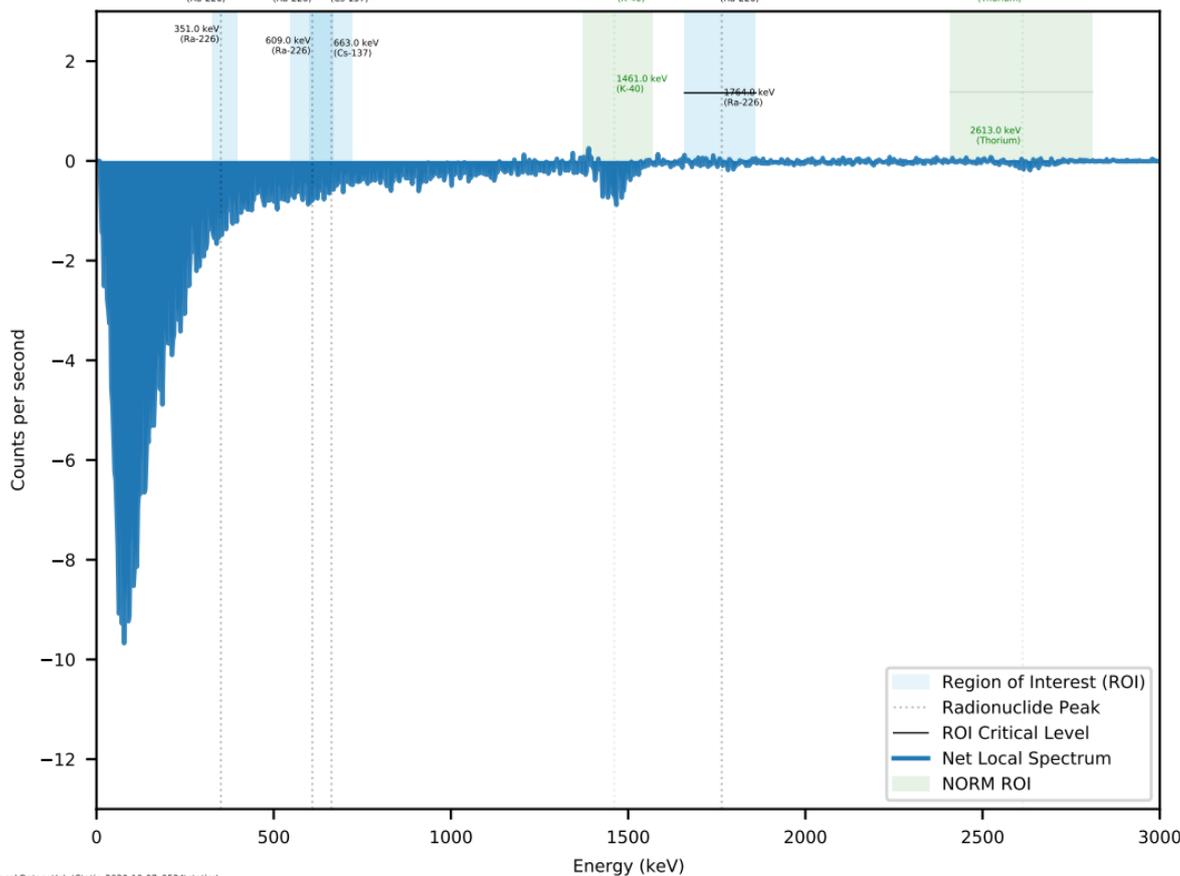


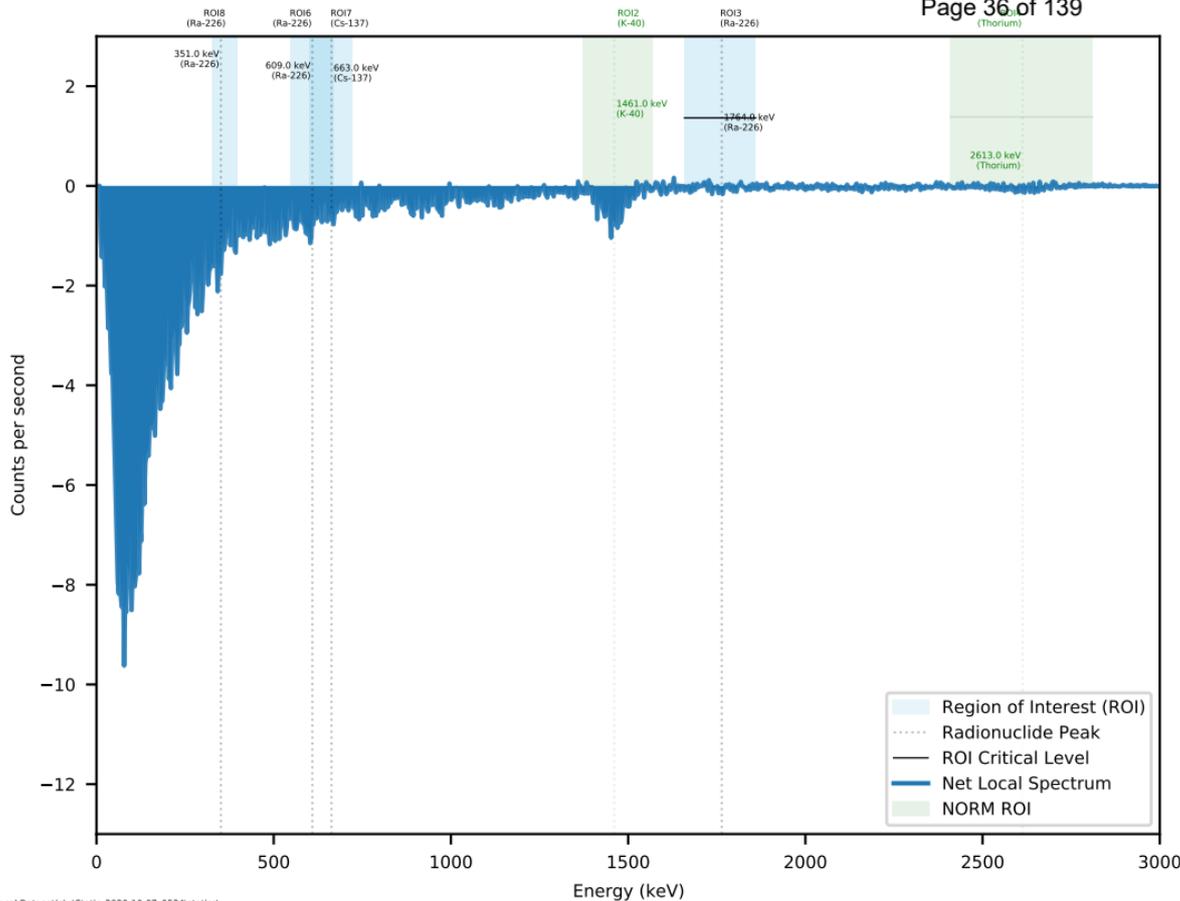


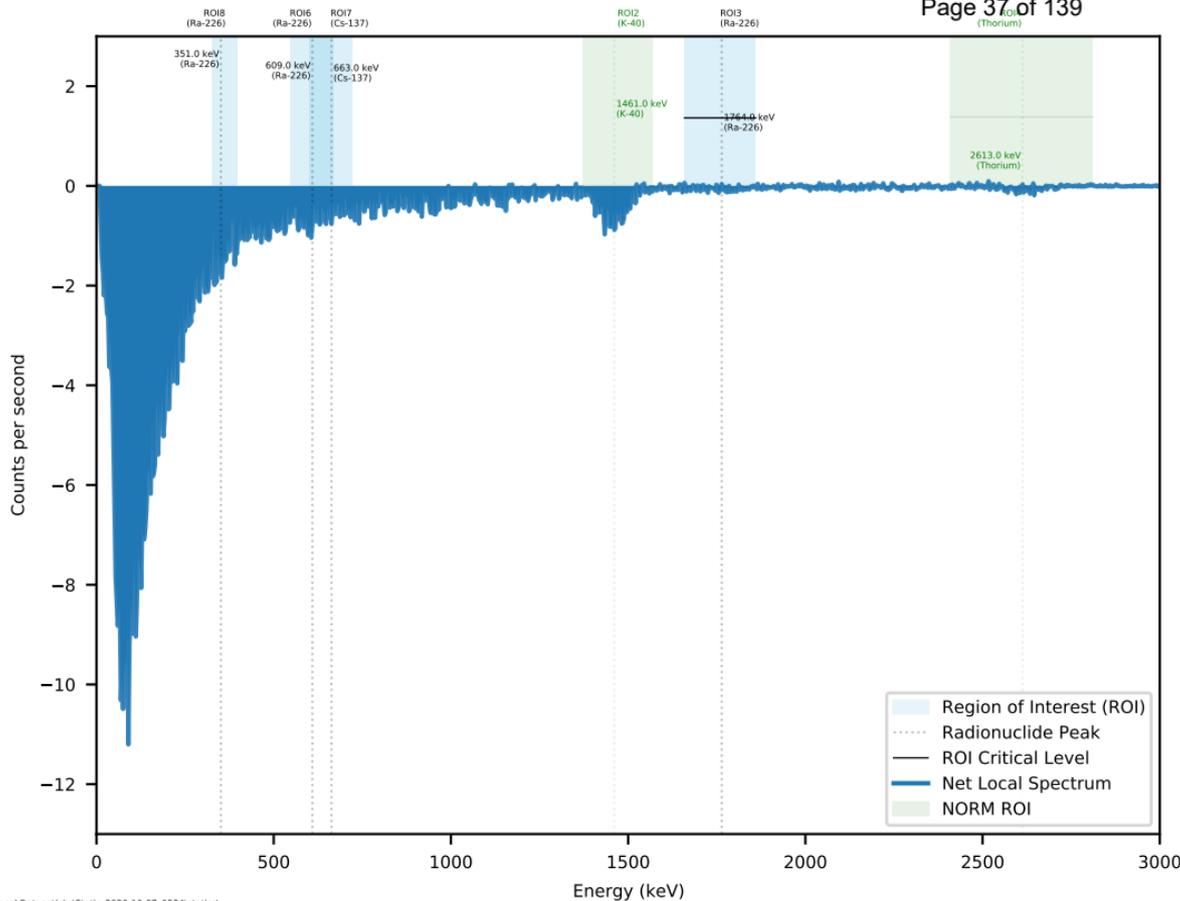


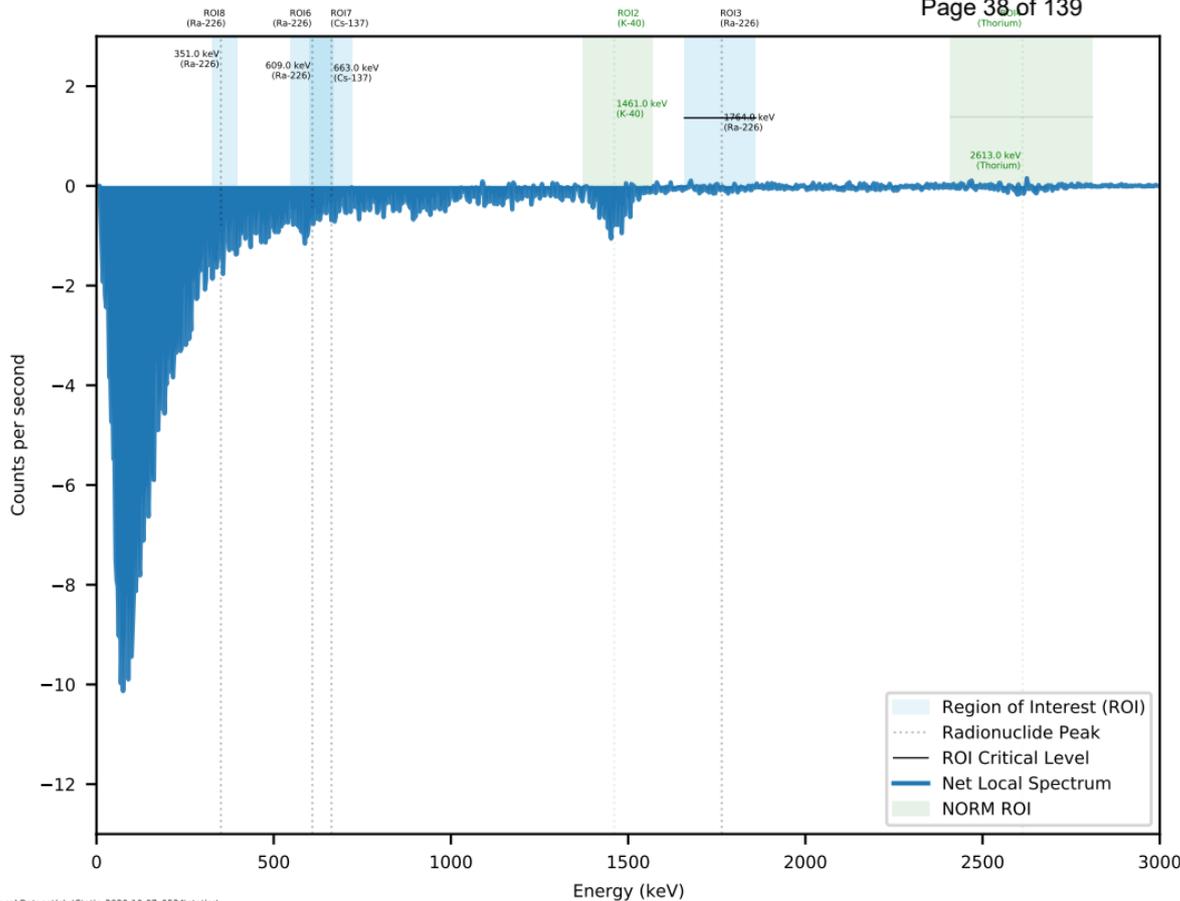


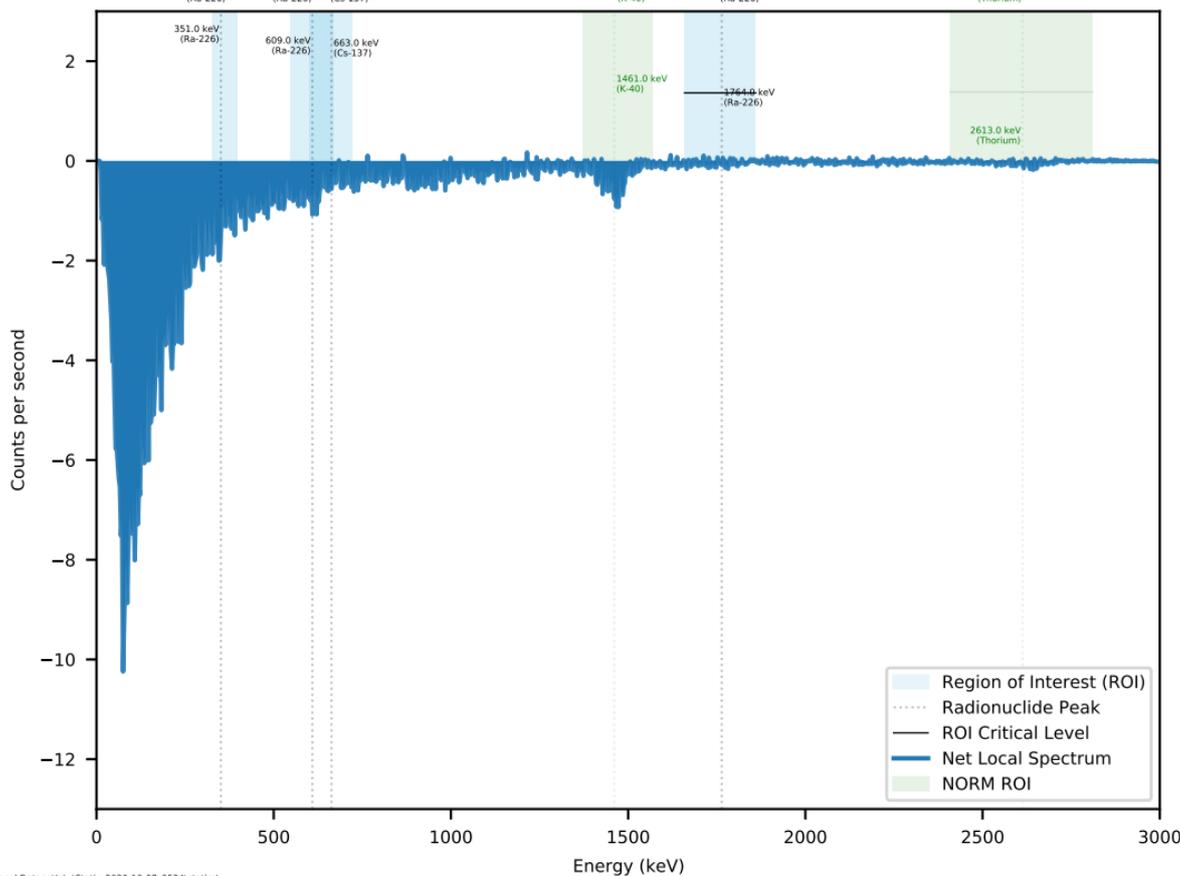


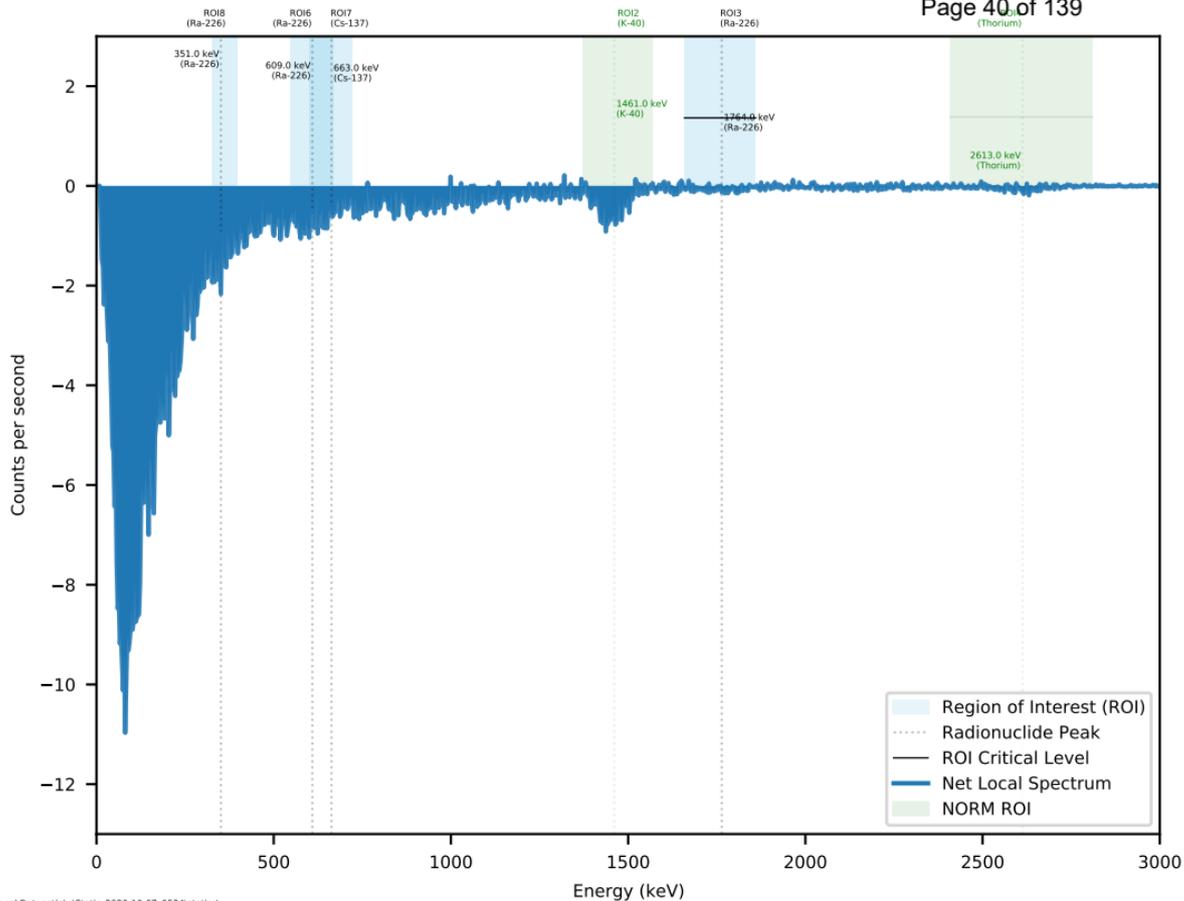


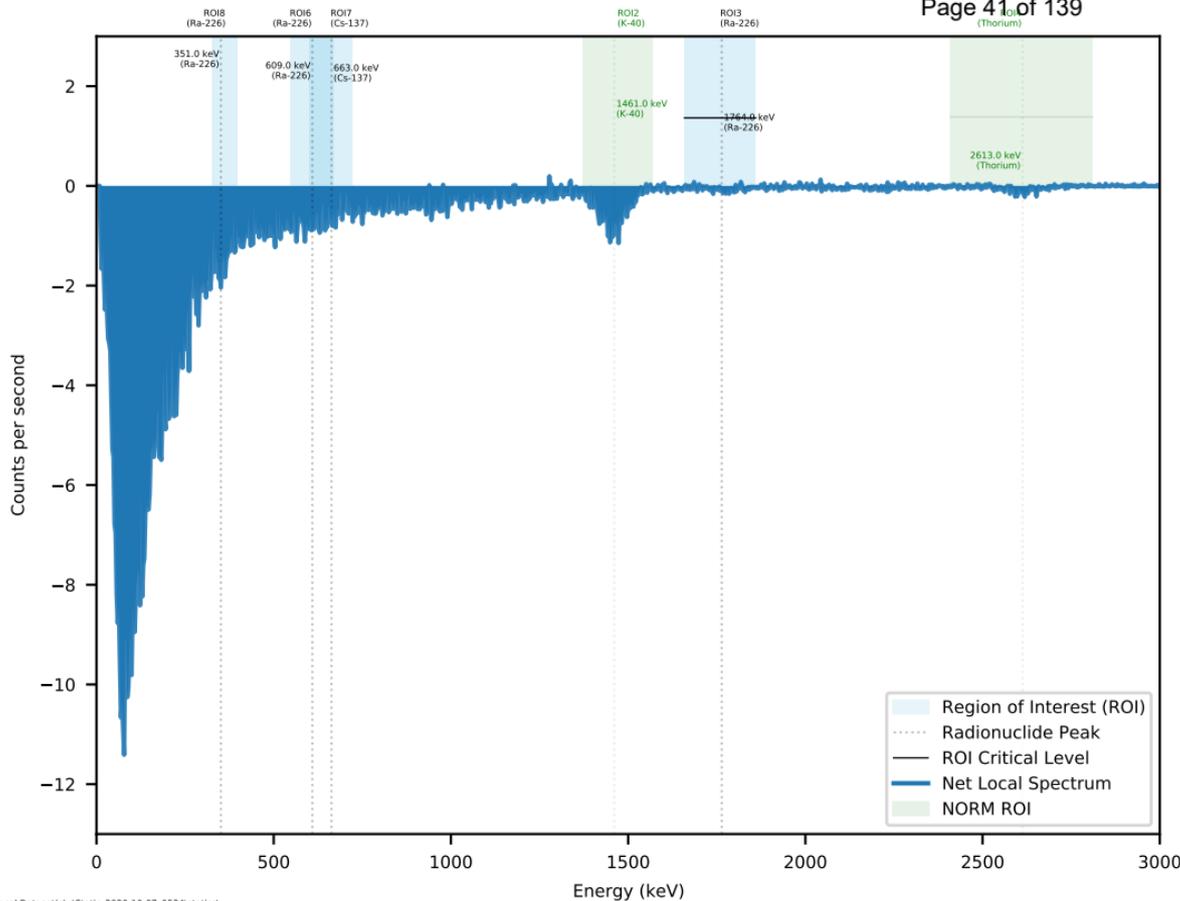


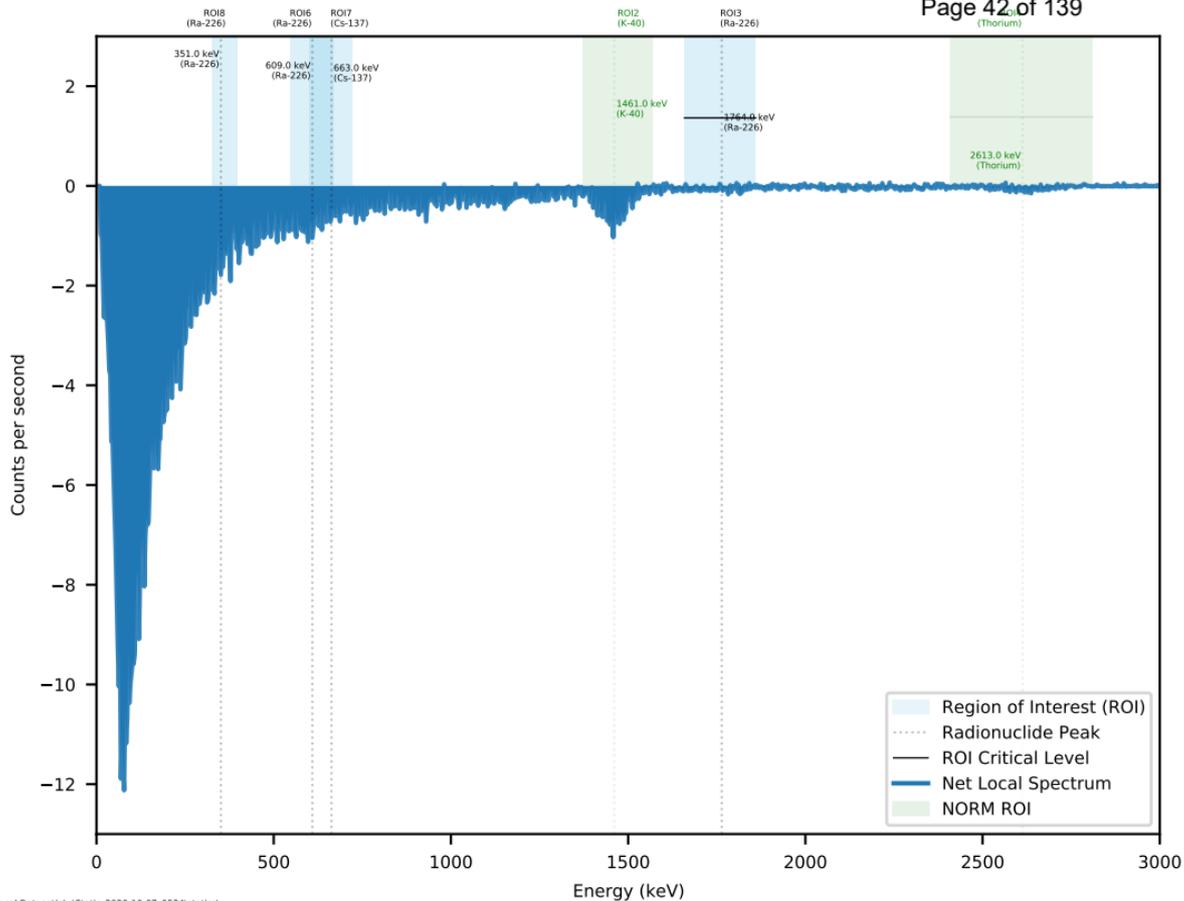


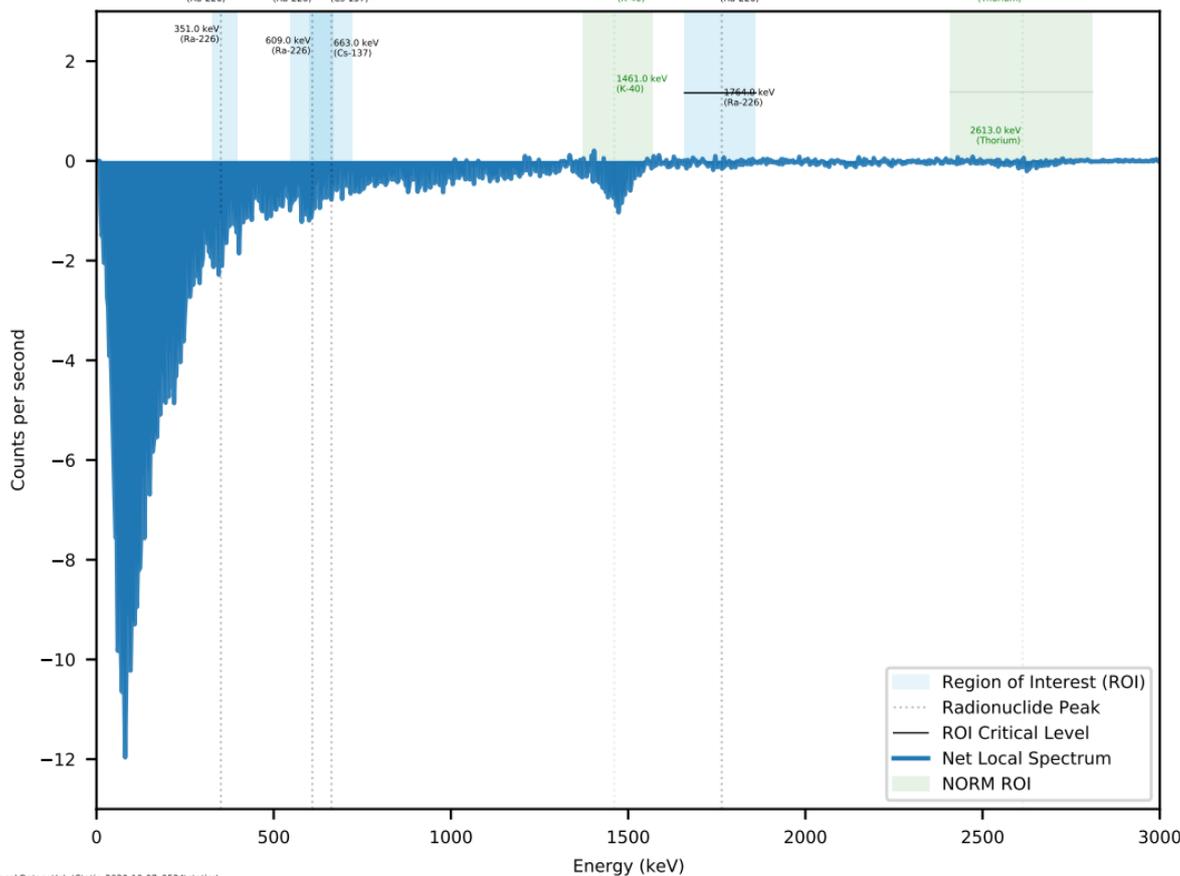


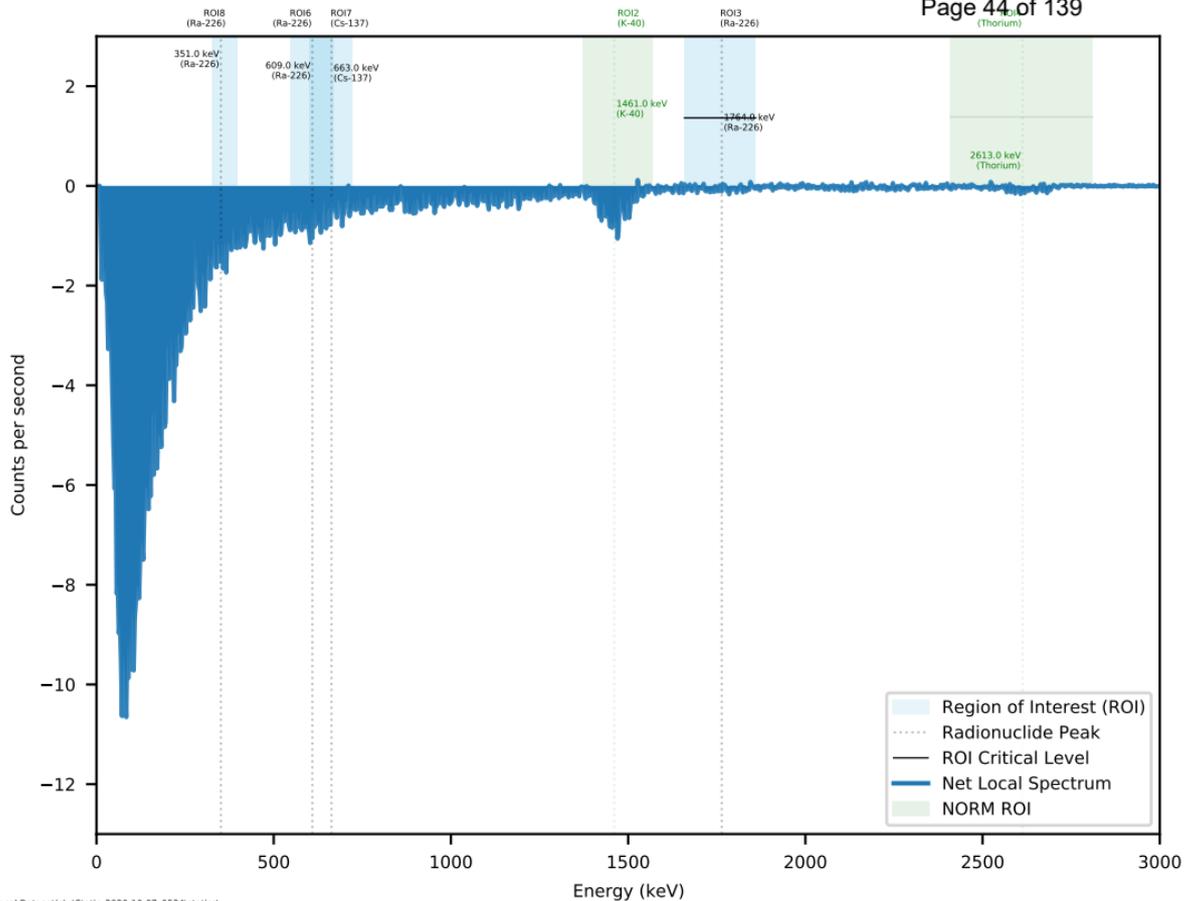


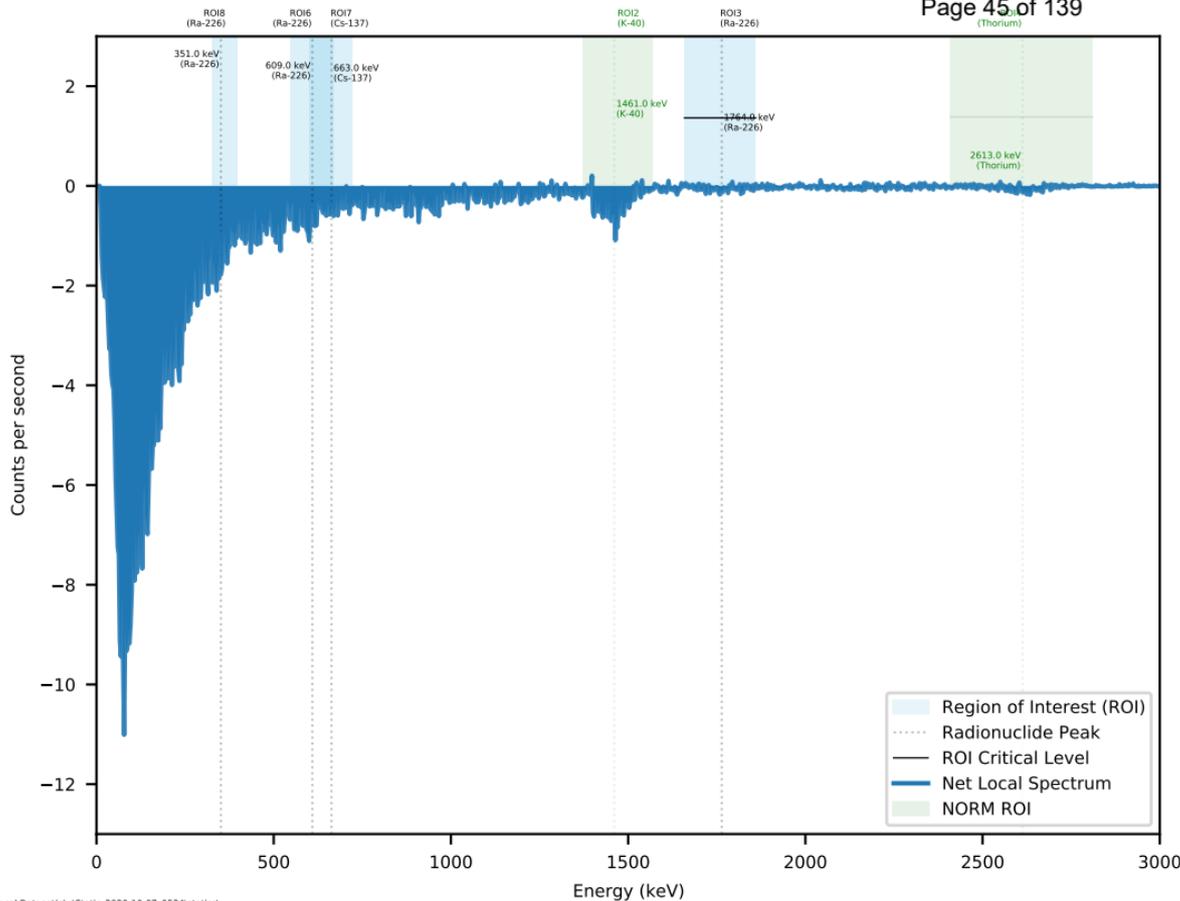


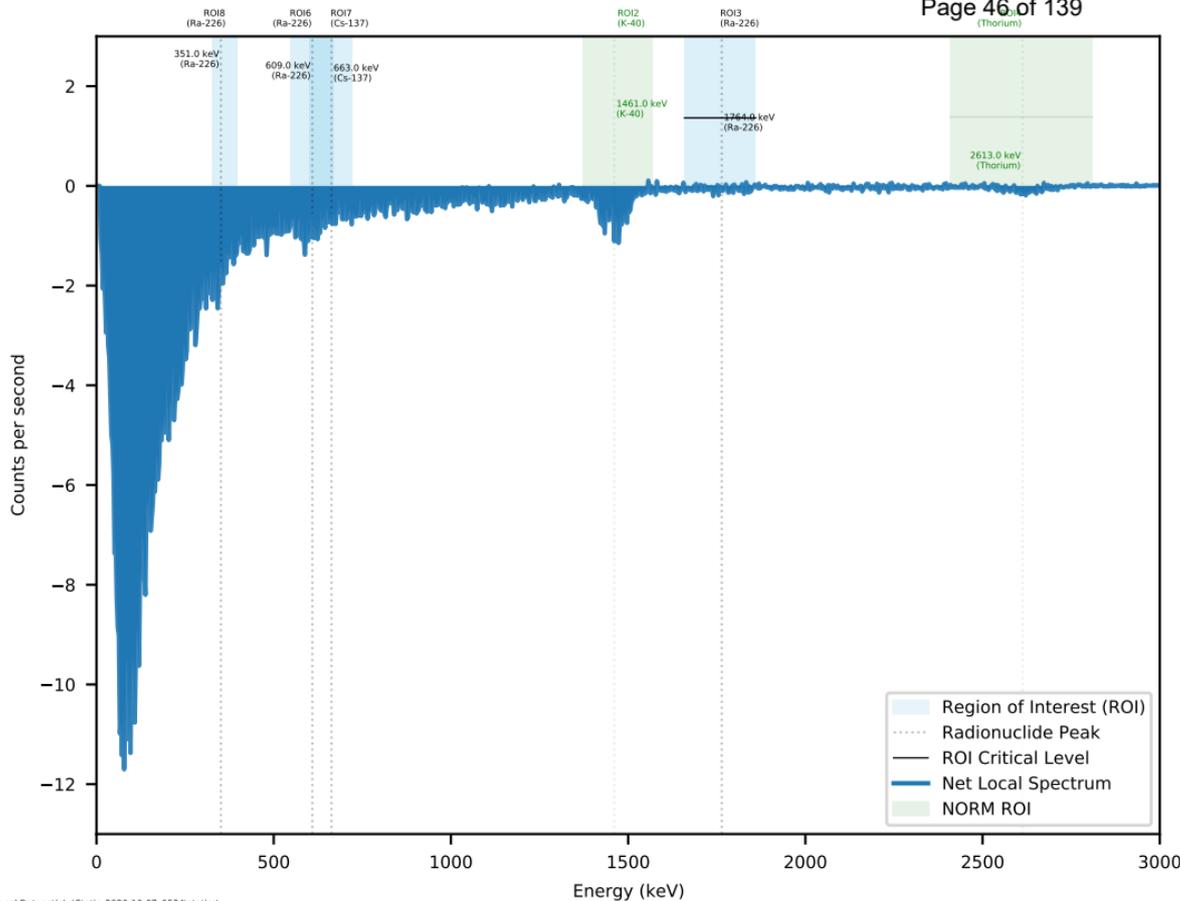


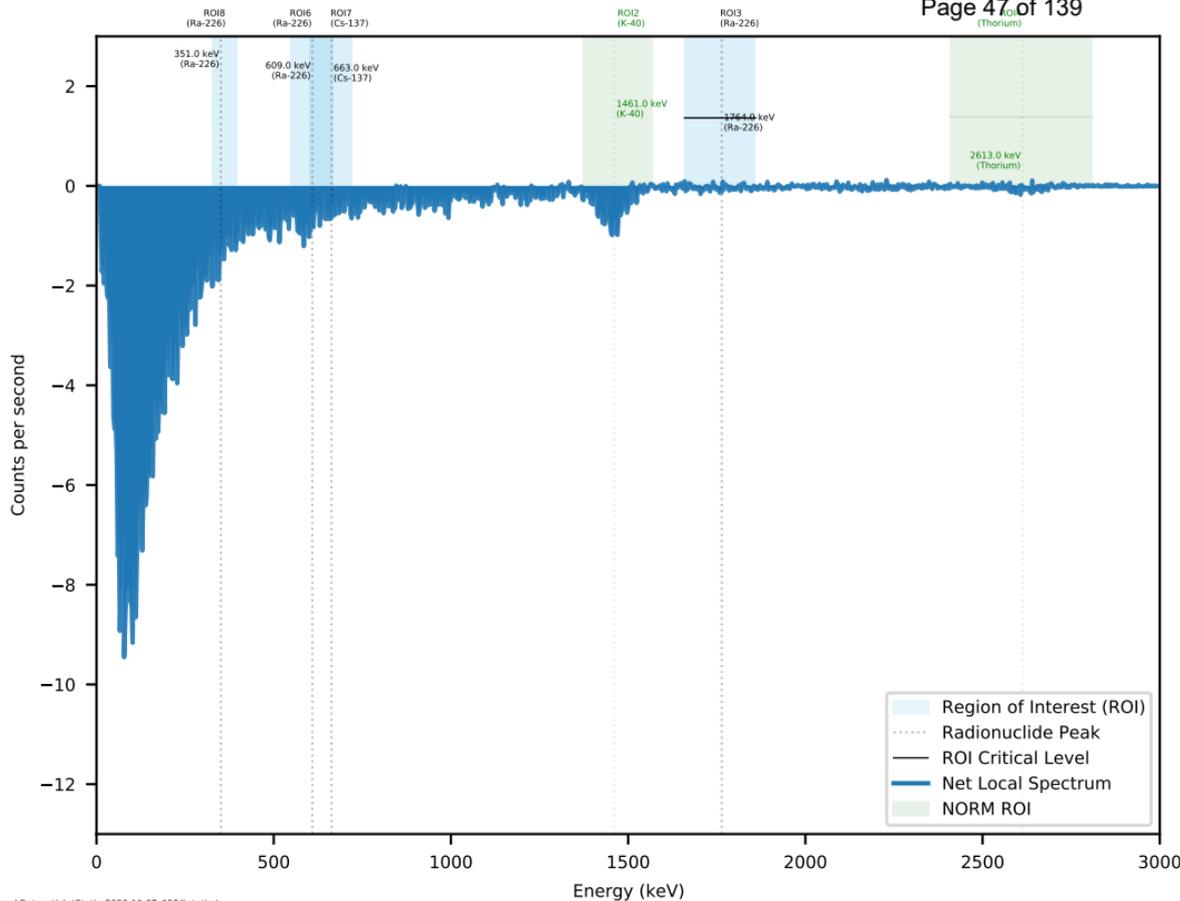


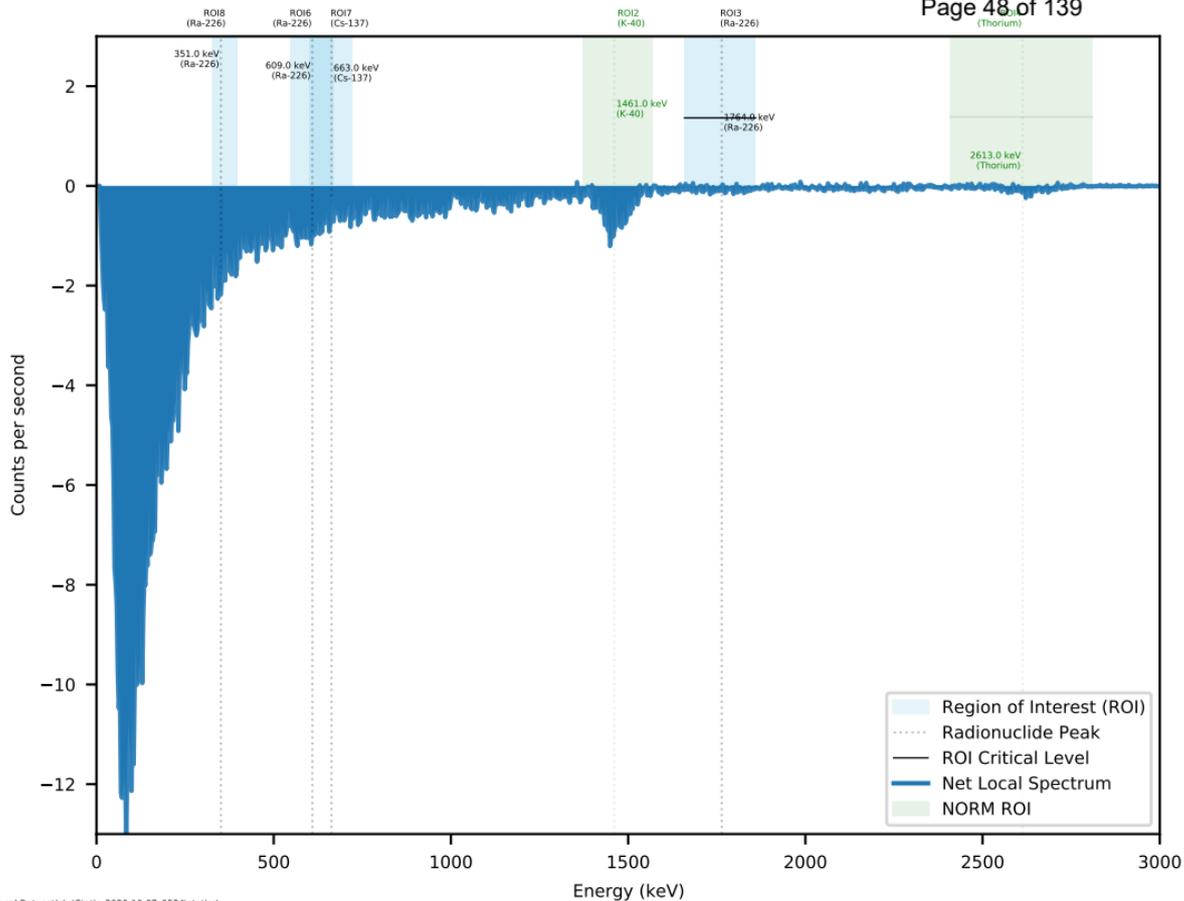


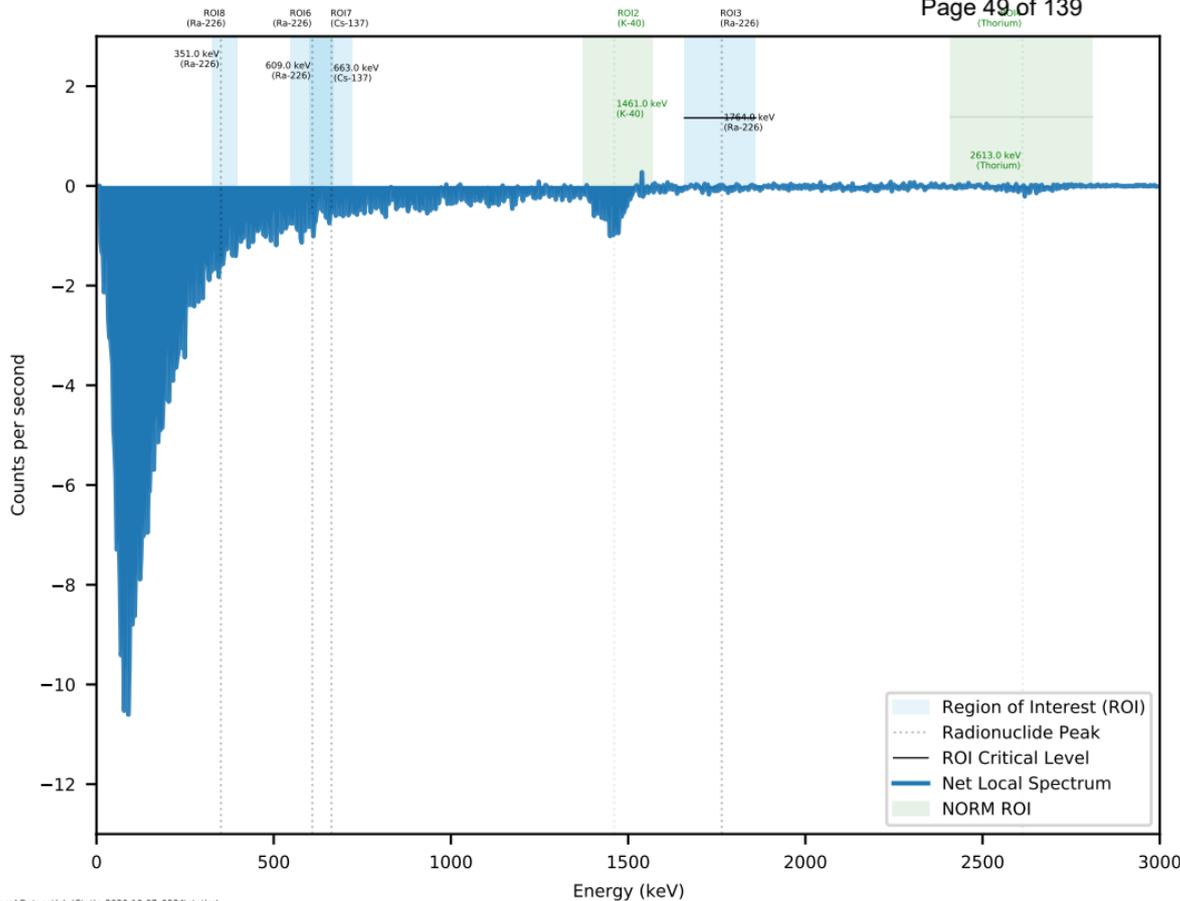


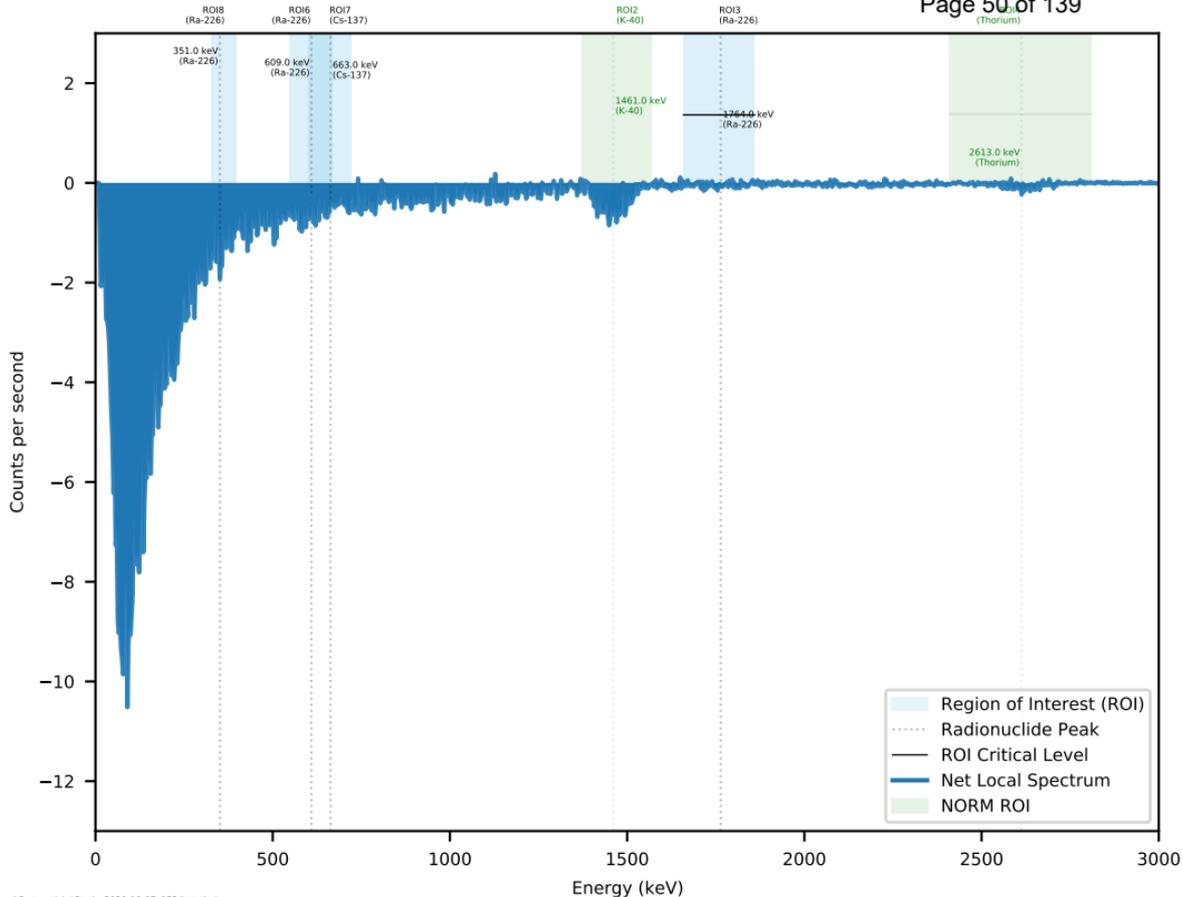


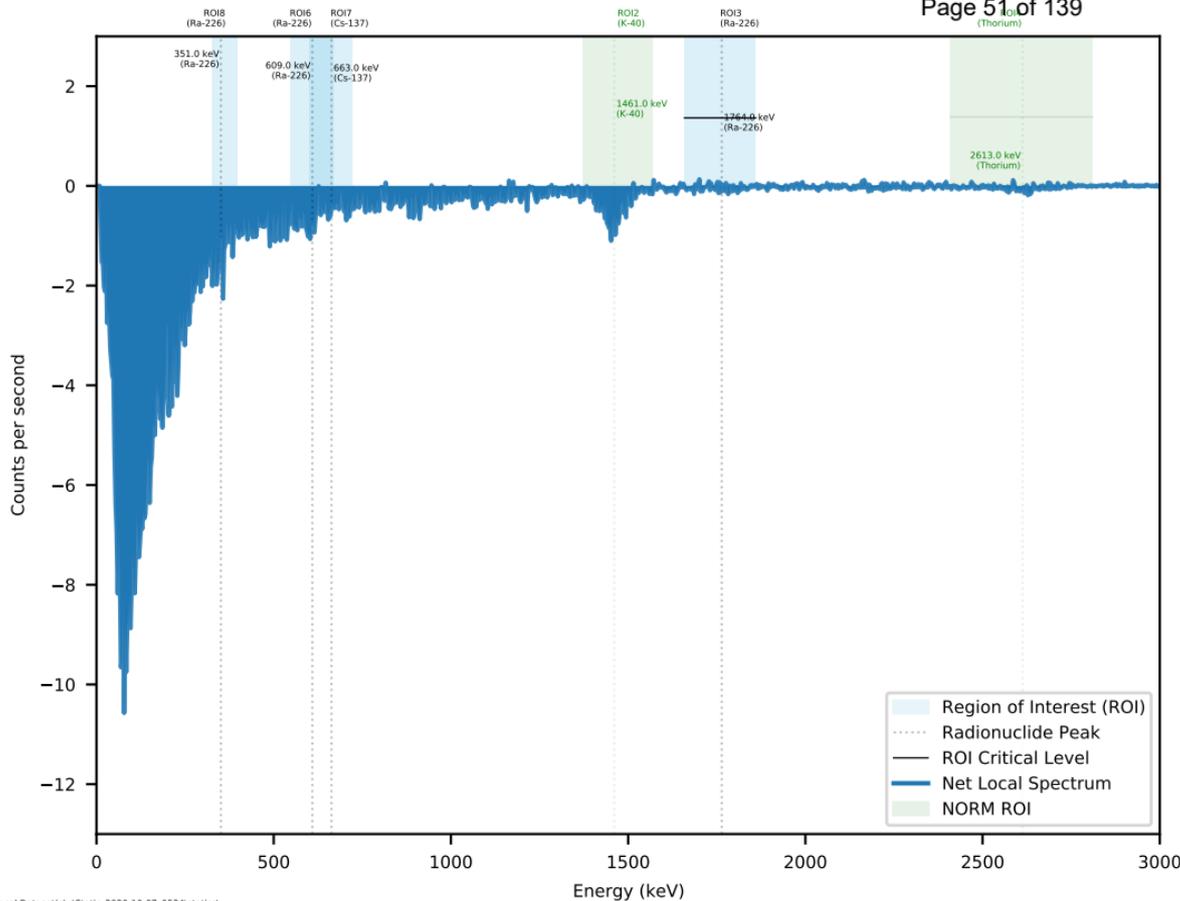


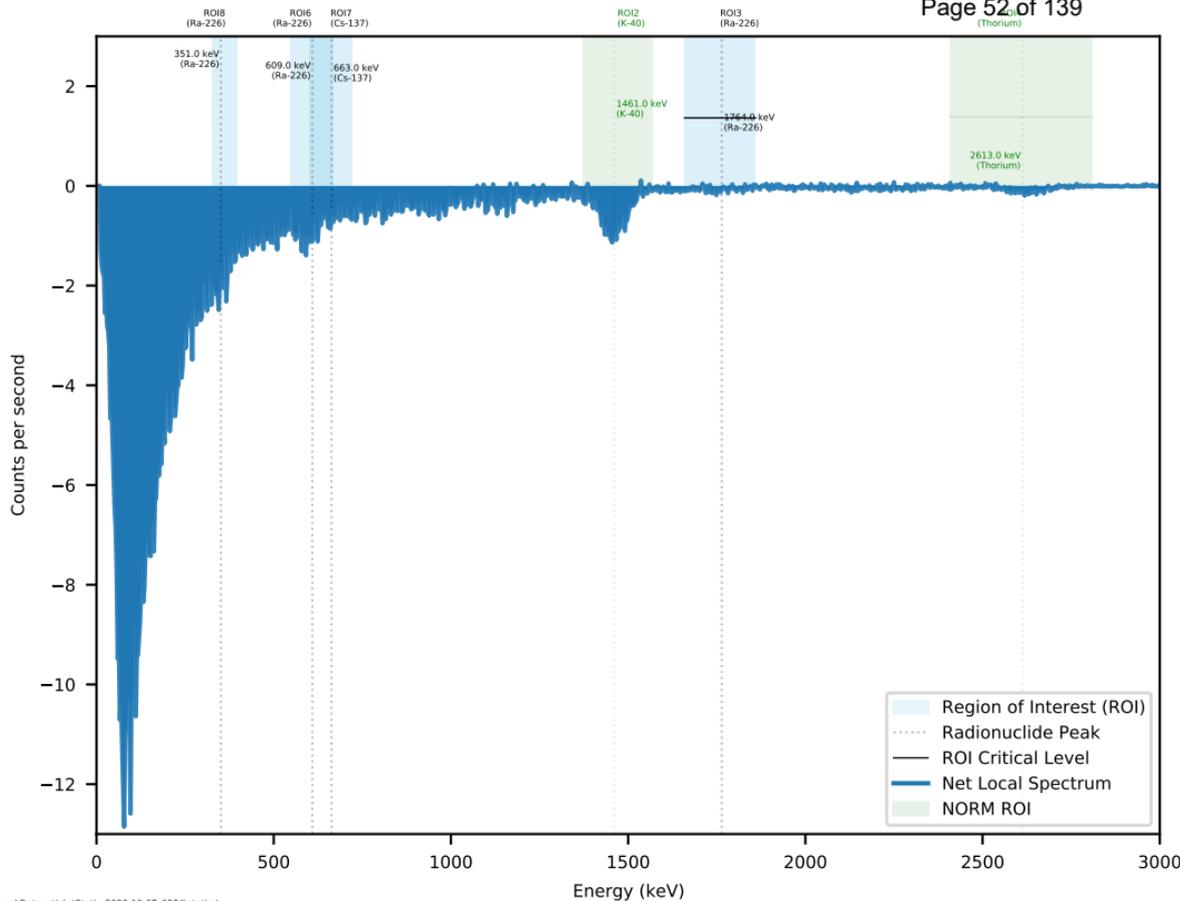


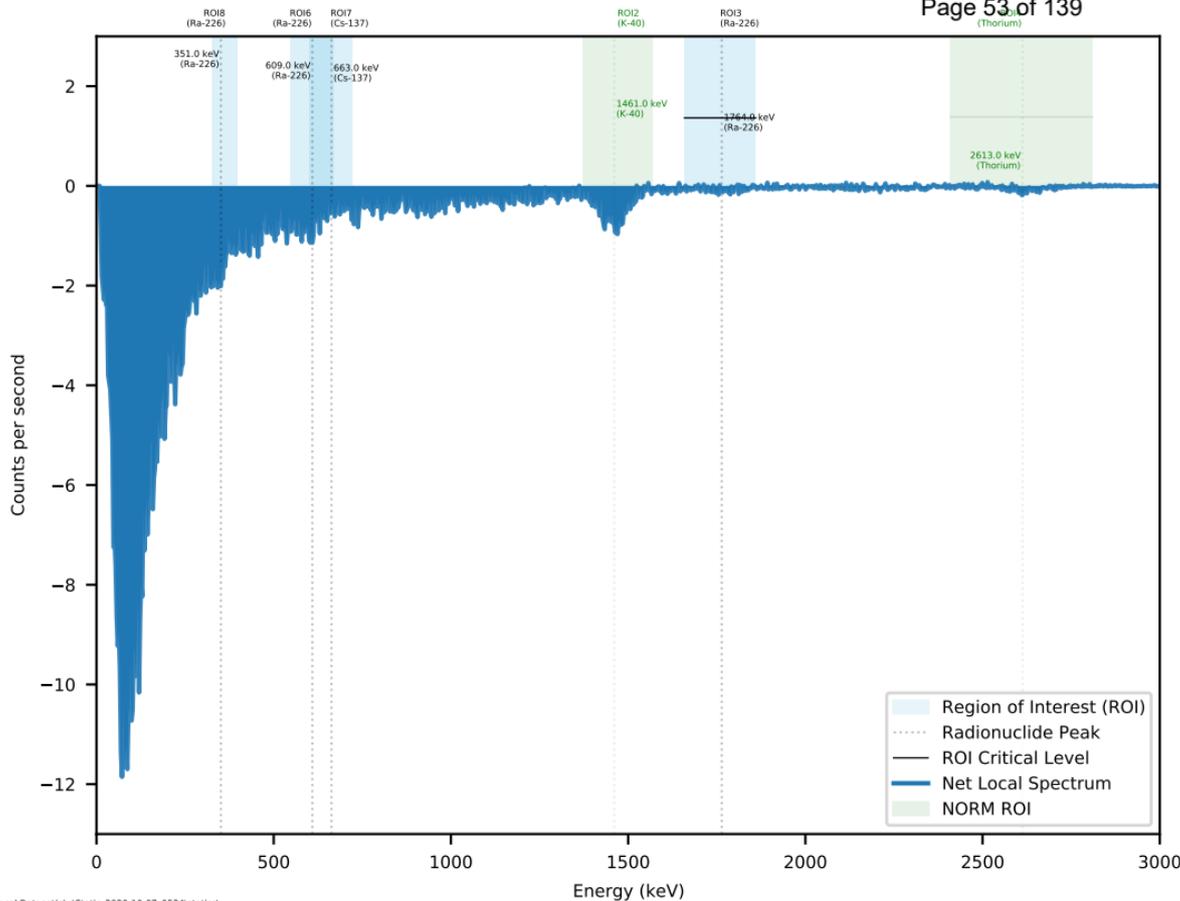


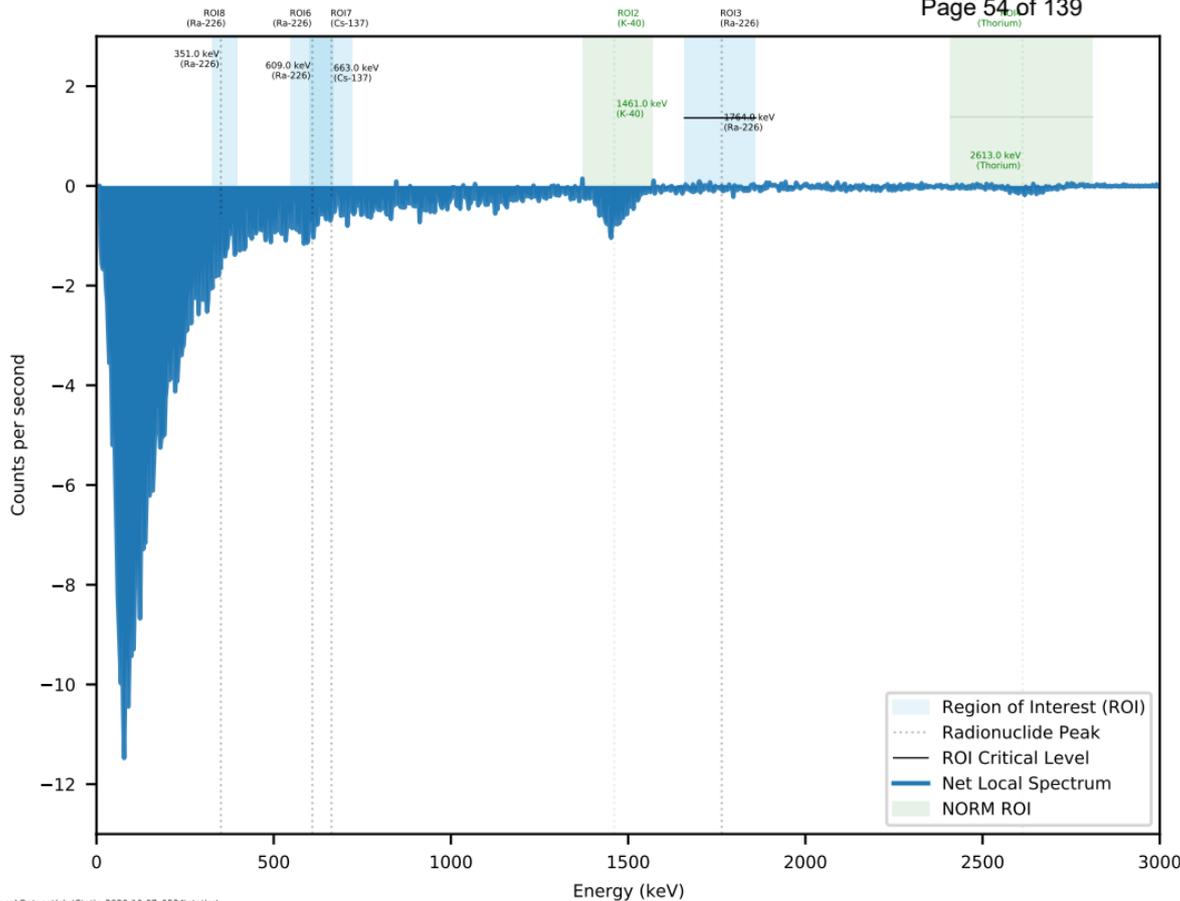


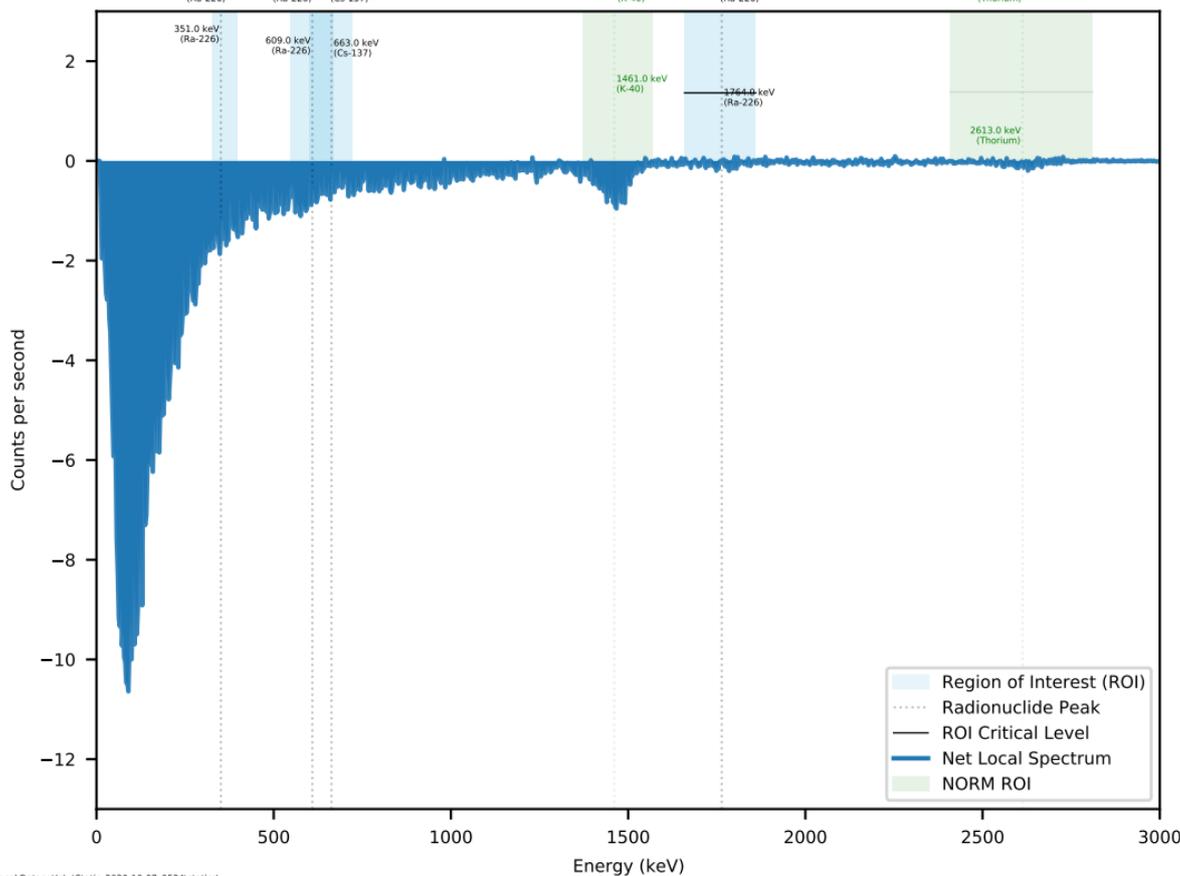














Environment Testing America

ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

Laboratory Job ID: 160-39827-1
Laboratory Sample Delivery Group: G146599785
Client Project/Site: HPNS-Parcel G 501197
Revision: 3

For:
Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
Concord, California 94520

Attn: Rose Condit

Rhonda Ridenhower

Authorized for release by:
4/6/2021 1:47:11 PM

Rhonda Ridenhower, Client Service Manager
(314)298-8566
Rhonda.Ridenhower@Eurofinset.com



LINKS

Review your project
results through
TotalAccess

Have a Question?



Visit us at:
www.eurofinsus.com/Env

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12



Table of Contents

Cover Page	1
Table of Contents	2
Case Narrative	3
Chain of Custody	6
Receipt Checklists	10
Definitions/Glossary	11
Method Summary	12
Sample Summary	13
Client Sample Results	14
QC Sample Results	29
QC Association Summary	33
Tracer Carrier Summary	35

Case Narrative

Page 58 of 139

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
SDG: G146599785

Job ID: 160-39827-1

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: HPNS-Parcel G 501197

Report Number: 160-39827-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved, Detailed information can be found in the most current revision of the associated SOP.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

Revision 1- Added Pa234 to gamma analyte list.

Revision 2- Incorrect GFPC blue monthly background, correct background and results reported in revision.

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
 SDG: G146599785

Job ID: 160-39827-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

Revision 3- Additional information requested in case narrative for total strontium

RECEIPT

The samples were received on 10/09/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 18.9 C.

TOTAL BETA STRONTIUM (GFPC)

Samples HPPG-ESU-TU153B-001 (160-39827-1), HPPG-ESU-TU153B-011 (160-39827-11) and HPPG-ESU-TU153B-021 (160-39827-21) were analyzed for Total Beta Strontium (GFPC) in accordance with EPA 905. The samples were dried on 10/12/2020, prepared on 10/20/2020 and 10/26/2020 and analyzed on 11/09/2020 and 11/11/2020.

When taking small mass aliquots from dried/disaggregated sample, the laboratory avoids large rocks/pebbles (as well as sticks, etc) which may constitute a larger than representative portion of the aliquot. Smaller rocks may be included. This is consistent with QSM and Laboratory SOP: HPPG-ESU-TU153B-001 (160-39827-1), HPPG-ESU-TU153B-011 (160-39827-11), HPPG-ESU-TU153B-021 (160-39827-21) and (160-39827-A-11-A DU).

The method blank (MB) Z-score is within limits and is located in the level IV raw data.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Samples HPPG-ESU-TU153B-001 (160-39827-1), HPPG-ESU-TU153B-002 (160-39827-2), HPPG-ESU-TU153B-003 (160-39827-3), HPPG-ESU-TU153B-004 (160-39827-4), HPPG-ESU-TU153B-005 (160-39827-5), HPPG-ESU-TU153B-006 (160-39827-6), HPPG-ESU-TU153B-007 (160-39827-7), HPPG-ESU-TU153B-008 (160-39827-8), HPPG-ESU-TU153B-009 (160-39827-9), HPPG-ESU-TU153B-010 (160-39827-10), HPPG-ESU-TU153B-011 (160-39827-11), HPPG-ESU-TU153B-012 (160-39827-12), HPPG-ESU-TU153B-013 (160-39827-13), HPPG-ESU-TU153B-014 (160-39827-14), HPPG-ESU-TU153B-015 (160-39827-15), HPPG-ESU-TU153B-016 (160-39827-16), HPPG-ESU-TU153B-017 (160-39827-17), HPPG-ESU-TU153B-018 (160-39827-18), HPPG-ESU-TU153B-019 (160-39827-19), HPPG-ESU-TU153B-020 (160-39827-20), HPPG-ESU-TU153B-021 (160-39827-21), HPPG-ESU-TU153B-022 (160-39827-22), HPPG-ESU-TU153B-023 (160-39827-23), HPPG-ESU-TU153B-024 (160-39827-24), HPPG-ESU-TU153B-025 (160-39827-25), HPPG-F-007 (160-39827-26) and HPPG-F-008 (160-39827-27) were analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA_01_R. The samples were dried on 10/12/2020 and 10/13/2020, prepared on 10/18/2020 and analyzed on 11/13/2020.

Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

Inferred from Reported to Analyte

Th-234	Pa-234
Th-234	U-238
Pb-210	Po-210
Pb-210	Bi-210
Cs-137	Ba-137m
Pb-212	Po-216
Xe-131m	Xe-131
Sb-125	Te-125m
Ag-108m	Ag-108
Rh-106	Ru-106
Pb-212	Th-228
Pb-212	Ra-224
U-235	Th-231
Ac-228	Th-232
Ac-228	Ra-228
Th-227	Ra-223
Th-227	Ac-227
Th-227	Bi-211

Case Narrative

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
SDG: G146599785

Job ID: 160-39827-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

Th-227	Pb-211
Bi-214	Ra-226

The MB z-score for Pb-214 associated with Prep Batch 160-486023 does not meet QC criteria. This appears to be random in nature, and limited deviations such as this are statistically expected when larger analyte lists are reported. Such excursions are often caused by fluctuations in Compton background, force-fitting of peaks that are not found by the software peak-search algorithm, and inclusion of inferior peak results by the software in weighted averages. The laboratory SOP allows for such statistical exceedances. (MB 160-486023/1-A)

The replicate precision for Th-234/U-238 associated with Prep Batch 160-485315 and 160-486023 does not meet QC criteria. This appears to be random in nature, and limited deviations such as this are statistically expected when larger analyte lists are reported. Such excursions are often caused by fluctuations in Compton background, force-fitting of peaks that are not found by the software peak-search algorithm, and inclusion of inferior peak results by the software in weighted averages. The laboratory SOP allows for such statistical exceedances. (160-39827-A-20-C DU)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.





CHAIN OF CUSTODY

Ref. Document # 501197RSY-007

APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy
City: Concord, CA 94520

Sample Lead: Lewis, Devin

Sample Tech(s): Joaquin Ramirez
Andrew Murri

Project Number: 501197

Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action

Project Location: San Francisco, CA

Purchase Order #: 1159058

Shipment/Pickup Date: 10/8/2020

Waybill Number: 4957 0225 2175

Lab Destination: Test America (St. Louis Lab)
13715 Rider Trail North
Earth City, MO 63046

Lab Contact Name/ph # Rhoeda Ridenbower (314)298-8566

Analysis Requested

Sample ID	Collection Information			Matrix	# of Containers	Container Type	Analysis Requested							Dose Rate uR/Hr	Evidence Bag ID	Comment
	Date	Time	Method				Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Total Strontium (EPA 905 MOD)	Strontium-90 (EPA 905 MOD)							
HPPG-ESU-TU153B-009	10/7/2020	12:39	G	SO	1	16 oz. plastic jar	X							4	GJ46599785	
HPPG-ESU-TU153B-010	10/7/2020	12:46	G	SO	1	16 oz. plastic jar	X							4	GJ46599785	
HPPG-ESU-TU153B-011	10/7/2020	12:52	G	SO	1	16 oz. plastic jar	X	X	X					4	GJ46599785	
HPPG-ESU-TU153B-012	10/7/2020	12:58	G	SO	1	16 oz. plastic jar	X							5	GJ46599785	
HPPG-ESU-TU153B-013	10/7/2020	13:05	G	SO	1	16 oz. plastic jar	X							5	GJ46599785	
HPPG-ESU-TU153B-014	10/7/2020	13:13	G	SO	1	16 oz. plastic jar	X							4	GJ46599785	
HPPG-ESU-TU153B-015	10/7/2020	13:18	G	SO	1	16 oz. plastic jar	X							5	GJ46599785	
HPPG-ESU-TU153B-016	10/7/2020	13:20	G	SO	1	16 oz. plastic jar	X							4	GJ46599785	
HPPG-ESU-TU153B-017	10/7/2020	13:22	G	SO	1	16 oz. plastic jar	X							4	GJ46599785	
HPPG-ESU-TU153B-018	10/7/2020	13:29	G	SO	1	16 oz. plastic jar	X							5	GJ46599785	
HPPG-ESU-TU153B-019	10/7/2020	13:31	G	SO	1	16 oz. plastic jar	X							4	GJ46599785	
HPPG-ESU-TU153B-020	10/7/2020	13:33	G	SO	1	16 oz. plastic jar	X							4	GJ46599785	
HPPG-ESU-TU153B-021	10/7/2020	13:35	G	SO	1	16 oz. plastic jar	X	X	X					4	GJ46599785	
HPPG-ESU-TU153B-022	10/7/2020	13:38	G	SO	1	16 oz. plastic jar	X							4	GJ46599785	
HPPG-ESU-TU153B-023	10/7/2020	13:41	G	SO	1	16 oz. plastic jar	X							4	GJ46599785	
HPPG-ESU-TU153B-024	10/7/2020	13:44	G	SO	1	16 oz. plastic jar	X							5	GJ46599785	
HPPG-ESU-TU153B-025	10/7/2020	13:49	G	SO	1	16 oz. plastic jar	X							4	GJ46599785	





CHAIN OF CUSTODY

Ref. Document # 501197RSY-007

APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy
City: Concord, CA 94520

Sample Lead: Lewis, Devin

Sample Tech(s): Joaquin Ramirez
Andrew Murri

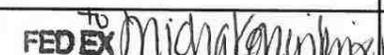
Project Number: 501197
Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action
Project Location: San Francisco, CA
Purchase Order #: 1159058
Shipment/Pickup Date: 10/8/2020
Waybill Number: 4957 0225 2175
Lab Destination: Test America (St. Louis Lab)
13715 Rider Trail North
Earth City, MO 63046

Lab Contact Name/ph #: Rhoeda Ridenbower (314)298-8566

Sample ID	Collection Information			Matrix	# of Containers	Container Type	Analysis Requested					Dose Rate uR/Hr	Evidence Bag ID	Comment
	Date	Time	Method				Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Total Strontium (EPA 905 MOD)	Strontium-90 (EPA 905 MOD)					
HPPG-F-007	10/7/2020	10:55	G	SO	1	16 oz. plastic jar	X					4	GJ46599785	
HPPG-F-008	10/7/2020	13:13	G	SO	1	16 oz. plastic jar	X					4	GJ46599785	



All Transfers for COC 501197RSY-007

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		10/07/2020 16:09	Locked Stored (RKillpack)		10/07/2020 16:09
Locked Stored (RKillpack)		10/08/2020 10:21	Devin Lewis		10/08/2020 10:21
Devin Lewis		10/08/2020 10:32	SHIPPEDTOLAB	FED EX  <i>To Michalek</i>	10/09/2020 08:55



Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-39827-1
SDG Number: G146599785**Login Number: 39827****List Source: Eurofins TestAmerica, St. Louis****List Number: 1****Creator: Ridenhower, Rhonda E**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
SDG: G146599785

Qualifiers

Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Method Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
SDG: G146599785

Method	Method Description	Protocol	Laboratory
905.0	Total Beta Strontium (GFPC)	DOE	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-0	Preparation, Digestion/ Precipitate	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy
None = None

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566



Sample Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
SDG: G146599785

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-39827-1	HPPG-ESU-TU153B-001	Solid	10/07/20 10:34	10/09/20 08:55	
160-39827-2	HPPG-ESU-TU153B-002	Solid	10/07/20 10:39	10/09/20 08:55	
160-39827-3	HPPG-ESU-TU153B-003	Solid	10/07/20 10:47	10/09/20 08:55	
160-39827-4	HPPG-ESU-TU153B-004	Solid	10/07/20 10:55	10/09/20 08:55	
160-39827-5	HPPG-ESU-TU153B-005	Solid	10/07/20 11:02	10/09/20 08:55	
160-39827-6	HPPG-ESU-TU153B-006	Solid	10/07/20 11:18	10/09/20 08:55	
160-39827-7	HPPG-ESU-TU153B-007	Solid	10/07/20 12:31	10/09/20 08:55	
160-39827-8	HPPG-ESU-TU153B-008	Solid	10/07/20 12:34	10/09/20 08:55	
160-39827-9	HPPG-ESU-TU153B-009	Solid	10/07/20 12:39	10/09/20 08:55	
160-39827-10	HPPG-ESU-TU153B-010	Solid	10/07/20 12:46	10/09/20 08:55	
160-39827-11	HPPG-ESU-TU153B-011	Solid	10/07/20 12:52	10/09/20 08:55	
160-39827-12	HPPG-ESU-TU153B-012	Solid	10/07/20 12:58	10/09/20 08:55	
160-39827-13	HPPG-ESU-TU153B-013	Solid	10/07/20 13:05	10/09/20 08:55	
160-39827-14	HPPG-ESU-TU153B-014	Solid	10/07/20 13:13	10/09/20 08:55	
160-39827-15	HPPG-ESU-TU153B-015	Solid	10/07/20 13:18	10/09/20 08:55	
160-39827-16	HPPG-ESU-TU153B-016	Solid	10/07/20 13:20	10/09/20 08:55	
160-39827-17	HPPG-ESU-TU153B-017	Solid	10/07/20 13:22	10/09/20 08:55	
160-39827-18	HPPG-ESU-TU153B-018	Solid	10/07/20 13:29	10/09/20 08:55	
160-39827-19	HPPG-ESU-TU153B-019	Solid	10/07/20 13:31	10/09/20 08:55	
160-39827-20	HPPG-ESU-TU153B-020	Solid	10/07/20 13:33	10/09/20 08:55	
160-39827-21	HPPG-ESU-TU153B-021	Solid	10/07/20 13:35	10/09/20 08:55	
160-39827-22	HPPG-ESU-TU153B-022	Solid	10/07/20 13:38	10/09/20 08:55	
160-39827-23	HPPG-ESU-TU153B-023	Solid	10/07/20 13:41	10/09/20 08:55	
160-39827-24	HPPG-ESU-TU153B-024	Solid	10/07/20 13:44	10/09/20 08:55	
160-39827-25	HPPG-ESU-TU153B-025	Solid	10/07/20 13:49	10/09/20 08:55	
160-39827-26	HPPG-F-007	Solid	10/07/20 10:55	10/09/20 08:55	
160-39827-27	HPPG-F-008	Solid	10/07/20 13:13	10/09/20 08:55	

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
 SDG: G146599785

Client Sample ID: HPPG-ESU-TU153B-001

Lab Sample ID: 160-39827-1

Date Collected: 10/07/20 10:34

Matrix: Solid

Date Received: 10/09/20 08:55

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Total Beta Strontium	-0.0282	U	0.0548	0.0548	0.160	0.0475	pCi/g	10/20/20 07:09	11/09/20 16:51	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	90.9		40 - 110					10/20/20 07:09	11/09/20 16:51	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.0994	U	0.225	0.225		0.346	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Actinium 228	0.334		0.141	0.145		0.102	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Bismuth-212	0.271	U	0.727	0.728		0.576	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Bismuth-214	0.367		0.121	0.127		0.0511	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Cesium-137	-0.0322	U	0.0633	0.0634	0.0700	0.0495	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Lead-210	-0.779	U	1.69	1.69		1.41	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Lead-212	0.271		0.0735	0.0814		0.0380	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Lead-214	0.354		0.112	0.118		0.0687	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Potassium-40	8.39		1.28	1.54		0.274	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Protactinium-231	0.000	U	0.393	0.393		1.97	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Protactinium-234	0.0783	U	0.250	0.250		0.203	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Radium-226	0.367		0.121	0.127	0.200	0.0511	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Radium-228	0.334		0.141	0.145		0.102	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Thallium-208	0.126		0.0510	0.0527		0.0198	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Thorium-232	0.334		0.141	0.145		0.102	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Thorium-234	0.353	U	0.476	0.478		0.369	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Thorium 228	0.271		0.0735	0.0814		0.0380	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Uranium-235	0.000	U	0.159	0.159		0.356	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Uranium-238	0.353	U	0.476	0.478		0.369	pCi/g	10/18/20 18:42	11/13/20 09:53	1

Client Sample ID: HPPG-ESU-TU153B-002

Lab Sample ID: 160-39827-2

Date Collected: 10/07/20 10:39

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.0146	U	0.0268	0.0268		0.406	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Actinium 228	0.448		0.229	0.235		0.0971	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Bismuth-212	-0.460	U	1.07	1.07		0.849	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Bismuth-214	0.460		0.142	0.152		0.0555	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Cesium-137	0.0145	U	0.0834	0.0834	0.0700	0.0676	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Lead-210	-0.701	U	1.79	1.79		1.50	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Lead-212	0.330		0.0858	0.0942		0.0425	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Lead-214	0.399		0.107	0.117		0.0586	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Potassium-40	9.82		1.53	1.90		0.278	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Protactinium-231	-0.913	U	3.02	3.02		2.46	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Protactinium-234	0.111	U	0.223	0.224		0.239	pCi/g	10/18/20 18:42	11/13/20 09:53	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
 SDG: G146599785

Client Sample ID: HPPG-ESU-TU153B-002

Lab Sample ID: 160-39827-2

Date Collected: 10/07/20 10:39

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Radium-226	0.460		0.142	0.152	0.200	0.0555	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Radium-228	0.448		0.229	0.235		0.0971	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Thallium-208	0.128		0.0911	0.0923		0.0380	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Thorium-232	0.448		0.229	0.235		0.0971	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Thorium-234	0.828		0.705	0.712		0.482	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Thorium 228	0.330		0.0858	0.0942		0.0425	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Uranium-235	0.0501	U	0.202	0.203		0.454	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Uranium-238	0.828		0.705	0.712		0.482	pCi/g	10/18/20 18:42	11/13/20 09:53	1

Client Sample ID: HPPG-ESU-TU153B-003

Lab Sample ID: 160-39827-3

Date Collected: 10/07/20 10:47

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.0374	U	0.114	0.114		0.429	pCi/g	10/18/20 18:42	11/13/20 10:34	1
Actinium 228	0.750		0.230	0.245		0.0641	pCi/g	10/18/20 18:42	11/13/20 10:34	1
Bismuth-212	-0.691	U	1.14	1.14		0.886	pCi/g	10/18/20 18:42	11/13/20 10:34	1
Bismuth-214	0.491		0.129	0.141		0.0397	pCi/g	10/18/20 18:42	11/13/20 10:34	1
Cesium-137	-0.00101	U	0.0620	0.0620	0.0700	0.0511	pCi/g	10/18/20 18:42	11/13/20 10:34	1
Lead-210	2.43		2.00	2.02		1.15	pCi/g	10/18/20 18:42	11/13/20 10:34	1
Lead-212	0.368		0.0999	0.109		0.0549	pCi/g	10/18/20 18:42	11/13/20 10:34	1
Lead-214	0.329		0.120	0.126		0.0565	pCi/g	10/18/20 18:42	11/13/20 10:34	1
Potassium-40	7.54		1.39	1.64		0.293	pCi/g	10/18/20 18:42	11/13/20 10:34	1
Protactinium-231	-1.10	U	3.76	3.76		3.07	pCi/g	10/18/20 18:42	11/13/20 10:34	1
Protactinium-234	0.138	U	0.244	0.245		0.253	pCi/g	10/18/20 18:42	11/13/20 10:34	1
Radium-226	0.491		0.129	0.141	0.200	0.0397	pCi/g	10/18/20 18:42	11/13/20 10:34	1
Radium-228	0.750		0.230	0.245		0.0641	pCi/g	10/18/20 18:42	11/13/20 10:34	1
Thallium-208	0.0921		0.0881	0.0887		0.0441	pCi/g	10/18/20 18:42	11/13/20 10:34	1
Thorium-232	0.750		0.230	0.245		0.0641	pCi/g	10/18/20 18:42	11/13/20 10:34	1
Thorium-234	0.0461	U	0.149	0.149		0.841	pCi/g	10/18/20 18:42	11/13/20 10:34	1
Thorium 228	0.368		0.0999	0.109		0.0549	pCi/g	10/18/20 18:42	11/13/20 10:34	1
Uranium-235	-0.0659	U	0.729	0.729		0.455	pCi/g	10/18/20 18:42	11/13/20 10:34	1
Uranium-238	0.0461	U	0.149	0.149		0.841	pCi/g	10/18/20 18:42	11/13/20 10:34	1

Client Sample ID: HPPG-ESU-TU153B-004

Lab Sample ID: 160-39827-4

Date Collected: 10/07/20 10:55

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.127	U	0.558	0.558		0.379	pCi/g	10/18/20 18:42	11/13/20 10:33	1
Actinium 228	0.351		0.176	0.180		0.0799	pCi/g	10/18/20 18:42	11/13/20 10:33	1
Bismuth-212	-0.573	U	0.971	0.973		0.760	pCi/g	10/18/20 18:42	11/13/20 10:33	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
 SDG: G146599785

Client Sample ID: HPPG-ESU-TU153B-004

Lab Sample ID: 160-39827-4

Date Collected: 10/07/20 10:55

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Bismuth-214	0.427		0.144	0.151		0.0588	pCi/g	10/18/20 18:42	11/13/20 10:33	1
Cesium-137	-0.00221	U	0.0531	0.0531	0.0700	0.0435	pCi/g	10/18/20 18:42	11/13/20 10:33	1
Lead-210	0.344	U	1.02	1.02		0.741	pCi/g	10/18/20 18:42	11/13/20 10:33	1
Lead-212	0.333		0.0854	0.0956		0.0454	pCi/g	10/18/20 18:42	11/13/20 10:33	1
Lead-214	0.396		0.143	0.149		0.0932	pCi/g	10/18/20 18:42	11/13/20 10:33	1
Potassium-40	9.79		1.42	1.74		0.291	pCi/g	10/18/20 18:42	11/13/20 10:33	1
Protactinium-231	0.691	U	1.85	1.85		2.02	pCi/g	10/18/20 18:42	11/13/20 10:33	1
Protactinium-234	-0.100	U	0.315	0.316		0.257	pCi/g	10/18/20 18:42	11/13/20 10:33	1
Radium-226	0.427		0.144	0.151	0.200	0.0588	pCi/g	10/18/20 18:42	11/13/20 10:33	1
Radium-228	0.351		0.176	0.180		0.0799	pCi/g	10/18/20 18:42	11/13/20 10:33	1
Thallium-208	0.106		0.0754	0.0762		0.0390	pCi/g	10/18/20 18:42	11/13/20 10:33	1
Thorium-232	0.351		0.176	0.180		0.0799	pCi/g	10/18/20 18:42	11/13/20 10:33	1
Thorium-234	1.12		0.598	0.611		0.407	pCi/g	10/18/20 18:42	11/13/20 10:33	1
Thorium 228	0.333		0.0854	0.0956		0.0454	pCi/g	10/18/20 18:42	11/13/20 10:33	1
Uranium-235	0.0672	U	0.381	0.381		0.479	pCi/g	10/18/20 18:42	11/13/20 10:33	1
Uranium-238	1.12		0.598	0.611		0.407	pCi/g	10/18/20 18:42	11/13/20 10:33	1

Client Sample ID: HPPG-ESU-TU153B-005

Lab Sample ID: 160-39827-5

Date Collected: 10/07/20 11:02

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.0618	U	0.516	0.516		0.318	pCi/g	10/18/20 18:42	11/13/20 10:28	1
Actinium 228	0.396		0.142	0.148		0.0298	pCi/g	10/18/20 18:42	11/13/20 10:28	1
Bismuth-212	-0.306	U	0.783	0.783		0.617	pCi/g	10/18/20 18:42	11/13/20 10:28	1
Bismuth-214	0.118	U	0.0744	0.0754		0.130	pCi/g	10/18/20 18:42	11/13/20 10:28	1
Cesium-137	-0.0253	U	0.0610	0.0610	0.0700	0.0478	pCi/g	10/18/20 18:42	11/13/20 10:28	1
Lead-210	-0.0409	U	1.61	1.61		1.32	pCi/g	10/18/20 18:42	11/13/20 10:28	1
Lead-212	0.273		0.0694	0.0750		0.0303	pCi/g	10/18/20 18:42	11/13/20 10:28	1
Lead-214	0.254		0.114	0.117		0.0876	pCi/g	10/18/20 18:42	11/13/20 10:28	1
Potassium-40	7.69		1.31	1.52		0.226	pCi/g	10/18/20 18:42	11/13/20 10:28	1
Protactinium-231	-0.858	U	2.85	2.85		2.32	pCi/g	10/18/20 18:42	11/13/20 10:28	1
Protactinium-234	0.0566	U	0.104	0.104		0.238	pCi/g	10/18/20 18:42	11/13/20 10:28	1
Radium-226	0.118	U	0.0744	0.0754	0.200	0.130	pCi/g	10/18/20 18:42	11/13/20 10:28	1
Radium-228	0.396		0.142	0.148		0.0298	pCi/g	10/18/20 18:42	11/13/20 10:28	1
Thallium-208	0.0825		0.0568	0.0574		0.0266	pCi/g	10/18/20 18:42	11/13/20 10:28	1
Thorium-232	0.396		0.142	0.148		0.0298	pCi/g	10/18/20 18:42	11/13/20 10:28	1
Thorium-234	0.318	U	0.525	0.526		0.410	pCi/g	10/18/20 18:42	11/13/20 10:28	1
Thorium 228	0.273		0.0694	0.0750		0.0303	pCi/g	10/18/20 18:42	11/13/20 10:28	1
Uranium-235	-0.0350	U	0.0623	0.0624		0.417	pCi/g	10/18/20 18:42	11/13/20 10:28	1
Uranium-238	0.318	U	0.525	0.526		0.410	pCi/g	10/18/20 18:42	11/13/20 10:28	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
 SDG: G146599785

Client Sample ID: HPPG-ESU-TU153B-006

Lab Sample ID: 160-39827-6

Date Collected: 10/07/20 11:18

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.101	U	0.219	0.220		0.267	pCi/g	10/18/20 18:42	11/13/20 10:30	1
Actinium 228	0.125		0.210	0.210		0.124	pCi/g	10/18/20 18:42	11/13/20 10:30	1
Bismuth-212	0.0104	U	0.592	0.592		0.487	pCi/g	10/18/20 18:42	11/13/20 10:30	1
Bismuth-214	0.381		0.116	0.122		0.0481	pCi/g	10/18/20 18:42	11/13/20 10:30	1
Cesium-137	0.0199	U	0.0349	0.0350	0.0700	0.0262	pCi/g	10/18/20 18:42	11/13/20 10:30	1
Lead-210	-0.678	U	1.47	1.47		1.18	pCi/g	10/18/20 18:42	11/13/20 10:30	1
Lead-212	0.463		0.0785	0.0988		0.0334	pCi/g	10/18/20 18:42	11/13/20 10:30	1
Lead-214	0.401		0.0797	0.0899		0.0345	pCi/g	10/18/20 18:42	11/13/20 10:30	1
Potassium-40	7.95		1.10	1.37		0.0890	pCi/g	10/18/20 18:42	11/13/20 10:30	1
Protactinium-231	0.574	U	1.59	1.59		1.74	pCi/g	10/18/20 18:42	11/13/20 10:30	1
Protactinium-234	-0.0243	U	0.0457	0.0458		0.206	pCi/g	10/18/20 18:42	11/13/20 10:30	1
Radium-226	0.381		0.116	0.122	0.200	0.0481	pCi/g	10/18/20 18:42	11/13/20 10:30	1
Radium-228	0.125		0.210	0.210		0.124	pCi/g	10/18/20 18:42	11/13/20 10:30	1
Thallium-208	0.166		0.0433	0.0466		0.0101	pCi/g	10/18/20 18:42	11/13/20 10:30	1
Thorium-232	0.125		0.210	0.210		0.124	pCi/g	10/18/20 18:42	11/13/20 10:30	1
Thorium-234	0.192	U	0.412	0.413		0.834	pCi/g	10/18/20 18:42	11/13/20 10:30	1
Thorium 228	0.463		0.0785	0.0988		0.0334	pCi/g	10/18/20 18:42	11/13/20 10:30	1
Uranium-235	0.0550	U	0.183	0.183		0.369	pCi/g	10/18/20 18:42	11/13/20 10:30	1
Uranium-238	0.192	U	0.412	0.413		0.834	pCi/g	10/18/20 18:42	11/13/20 10:30	1

Client Sample ID: HPPG-ESU-TU153B-007

Lab Sample ID: 160-39827-7

Date Collected: 10/07/20 12:31

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.225	U	0.459	0.460		0.272	pCi/g	10/18/20 18:42	11/13/20 10:22	1
Actinium 228	0.264		0.264	0.265		0.151	pCi/g	10/18/20 18:42	11/13/20 10:22	1
Bismuth-212	0.0912	U	0.977	0.977		0.797	pCi/g	10/18/20 18:42	11/13/20 10:22	1
Bismuth-214	0.382		0.128	0.133		0.0451	pCi/g	10/18/20 18:42	11/13/20 10:22	1
Cesium-137	0.0274	U	0.0627	0.0628	0.0700	0.0483	pCi/g	10/18/20 18:42	11/13/20 10:22	1
Lead-210	1.04		1.61	1.62		1.04	pCi/g	10/18/20 18:42	11/13/20 10:22	1
Lead-212	0.386		0.0899	0.0985		0.0423	pCi/g	10/18/20 18:42	11/13/20 10:22	1
Lead-214	0.483		0.109	0.119		0.0406	pCi/g	10/18/20 18:42	11/13/20 10:22	1
Potassium-40	8.66		1.60	1.82		0.250	pCi/g	10/18/20 18:42	11/13/20 10:22	1
Protactinium-231	0.000	U	0.662	0.662		2.39	pCi/g	10/18/20 18:42	11/13/20 10:22	1
Protactinium-234	0.194	U	0.235	0.236		0.214	pCi/g	10/18/20 18:42	11/13/20 10:22	1
Radium-226	0.382		0.128	0.133	0.200	0.0451	pCi/g	10/18/20 18:42	11/13/20 10:22	1
Radium-228	0.264		0.264	0.265		0.151	pCi/g	10/18/20 18:42	11/13/20 10:22	1
Thallium-208	0.122		0.0895	0.0904		0.0449	pCi/g	10/18/20 18:42	11/13/20 10:22	1
Thorium-232	0.264		0.264	0.265		0.151	pCi/g	10/18/20 18:42	11/13/20 10:22	1
Thorium-234	0.830		0.581	0.588		0.424	pCi/g	10/18/20 18:42	11/13/20 10:22	1
Thorium 228	0.386		0.0899	0.0985		0.0423	pCi/g	10/18/20 18:42	11/13/20 10:22	1
Uranium-235	0.0584	U	0.129	0.129		0.467	pCi/g	10/18/20 18:42	11/13/20 10:22	1
Uranium-238	0.830		0.581	0.588		0.424	pCi/g	10/18/20 18:42	11/13/20 10:22	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
 SDG: G146599785

Client Sample ID: HPPG-ESU-TU153B-008

Lab Sample ID: 160-39827-8

Date Collected: 10/07/20 12:34

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.131	U	0.275	0.275		0.209	pCi/g	10/18/20 18:42	11/13/20 10:24	1
Actinium 228	0.583		0.166	0.177		0.0269	pCi/g	10/18/20 18:42	11/13/20 10:24	1
Bismuth-212	0.222	U	0.629	0.629		0.496	pCi/g	10/18/20 18:42	11/13/20 10:24	1
Bismuth-214	0.389		0.128	0.134		0.0483	pCi/g	10/18/20 18:42	11/13/20 10:24	1
Cesium-137	0.0267	U	0.0459	0.0460	0.0700	0.0347	pCi/g	10/18/20 18:42	11/13/20 10:24	1
Lead-210	0.0332	U	1.48	1.48		1.20	pCi/g	10/18/20 18:42	11/13/20 10:24	1
Lead-212	0.296		0.0822	0.0907		0.0465	pCi/g	10/18/20 18:42	11/13/20 10:24	1
Lead-214	0.435		0.105	0.115		0.0444	pCi/g	10/18/20 18:42	11/13/20 10:24	1
Potassium-40	7.61		1.33	1.55		0.378	pCi/g	10/18/20 18:42	11/13/20 10:24	1
Protactinium-231	-0.708	U	2.61	2.62		2.13	pCi/g	10/18/20 18:42	11/13/20 10:24	1
Protactinium-234	0.0148	U	0.0247	0.0247		0.167	pCi/g	10/18/20 18:42	11/13/20 10:24	1
Radium-226	0.389		0.128	0.134	0.200	0.0483	pCi/g	10/18/20 18:42	11/13/20 10:24	1
Radium-228	0.583		0.166	0.177		0.0269	pCi/g	10/18/20 18:42	11/13/20 10:24	1
Thallium-208	0.111		0.0910	0.0918		0.0403	pCi/g	10/18/20 18:42	11/13/20 10:24	1
Thorium-232	0.583		0.166	0.177		0.0269	pCi/g	10/18/20 18:42	11/13/20 10:24	1
Thorium-234	-0.244	U	0.940	0.941		0.780	pCi/g	10/18/20 18:42	11/13/20 10:24	1
Thorium 228	0.296		0.0822	0.0907		0.0465	pCi/g	10/18/20 18:42	11/13/20 10:24	1
Uranium-235	-0.0245	U	0.176	0.176		0.248	pCi/g	10/18/20 18:42	11/13/20 10:24	1
Uranium-238	-0.244	U	0.940	0.941		0.780	pCi/g	10/18/20 18:42	11/13/20 10:24	1

Client Sample ID: HPPG-ESU-TU153B-009

Lab Sample ID: 160-39827-9

Date Collected: 10/07/20 12:39

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.0448	U	0.636	0.636		0.356	pCi/g	10/18/20 18:42	11/13/20 10:31	1
Actinium 228	0.678		0.184	0.197		0.0819	pCi/g	10/18/20 18:42	11/13/20 10:31	1
Bismuth-212	0.265	U	0.438	0.439		0.311	pCi/g	10/18/20 18:42	11/13/20 10:31	1
Bismuth-214	0.378		0.132	0.138		0.0500	pCi/g	10/18/20 18:42	11/13/20 10:31	1
Cesium-137	0.0422	U	0.0759	0.0760	0.0700	0.0589	pCi/g	10/18/20 18:42	11/13/20 10:31	1
Lead-210	-1.04	U	0.900	0.908		1.39	pCi/g	10/18/20 18:42	11/13/20 10:31	1
Lead-212	0.332		0.0972	0.106		0.0576	pCi/g	10/18/20 18:42	11/13/20 10:31	1
Lead-214	0.296		0.145	0.148		0.100	pCi/g	10/18/20 18:42	11/13/20 10:31	1
Potassium-40	7.85		1.38	1.60		0.142	pCi/g	10/18/20 18:42	11/13/20 10:31	1
Protactinium-231	0.00000011	U	2.96	2.96		2.44	pCi/g	10/18/20 18:42	11/13/20 10:31	1
	6									
Protactinium-234	0.0968	U	0.253	0.253		0.205	pCi/g	10/18/20 18:42	11/13/20 10:31	1
Radium-226	0.378		0.132	0.138	0.200	0.0500	pCi/g	10/18/20 18:42	11/13/20 10:31	1
Radium-228	0.678		0.184	0.197		0.0819	pCi/g	10/18/20 18:42	11/13/20 10:31	1
Thallium-208	0.154		0.0747	0.0764		0.0288	pCi/g	10/18/20 18:42	11/13/20 10:31	1
Thorium-232	0.678		0.184	0.197		0.0819	pCi/g	10/18/20 18:42	11/13/20 10:31	1
Thorium-234	-0.876	U	0.775	0.781		0.911	pCi/g	10/18/20 18:42	11/13/20 10:31	1
Thorium 228	0.332		0.0972	0.106		0.0576	pCi/g	10/18/20 18:42	11/13/20 10:31	1
Uranium-235	-0.0202	U	0.563	0.563		0.386	pCi/g	10/18/20 18:42	11/13/20 10:31	1
Uranium-238	-0.876	U	0.775	0.781		0.911	pCi/g	10/18/20 18:42	11/13/20 10:31	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
 SDG: G146599785

Client Sample ID: HPPG-ESU-TU153B-010

Lab Sample ID: 160-39827-10

Date Collected: 10/07/20 12:46

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.183	U	0.376	0.376		0.221	pCi/g	10/18/20 18:42	11/13/20 11:48	1
Actinium 228	0.442		0.134	0.141		0.0354	pCi/g	10/18/20 18:42	11/13/20 11:48	1
Bismuth-212	0.0501	U	0.776	0.776		0.634	pCi/g	10/18/20 18:42	11/13/20 11:48	1
Bismuth-214	0.367		0.113	0.119		0.0381	pCi/g	10/18/20 18:42	11/13/20 11:48	1
Cesium-137	-0.0243	U	0.0678	0.0679	0.0700	0.0503	pCi/g	10/18/20 18:42	11/13/20 11:48	1
Lead-210	0.666	U	1.32	1.33		0.881	pCi/g	10/18/20 18:42	11/13/20 11:48	1
Lead-212	0.340		0.0714	0.0797		0.0245	pCi/g	10/18/20 18:42	11/13/20 11:48	1
Lead-214	0.304		0.0887	0.0939		0.0385	pCi/g	10/18/20 18:42	11/13/20 11:48	1
Potassium-40	8.24		1.46	1.68		0.220	pCi/g	10/18/20 18:42	11/13/20 11:48	1
Protactinium-231	0.178	U	1.29	1.29		2.00	pCi/g	10/18/20 18:42	11/13/20 11:48	1
Protactinium-234	0.140	U	0.190	0.191		0.150	pCi/g	10/18/20 18:42	11/13/20 11:48	1
Radium-226	0.367		0.113	0.119	0.200	0.0381	pCi/g	10/18/20 18:42	11/13/20 11:48	1
Radium-228	0.442		0.134	0.141		0.0354	pCi/g	10/18/20 18:42	11/13/20 11:48	1
Thallium-208	0.138		0.0519	0.0537		0.0168	pCi/g	10/18/20 18:42	11/13/20 11:48	1
Thorium-232	0.442		0.134	0.141		0.0354	pCi/g	10/18/20 18:42	11/13/20 11:48	1
Thorium-234	0.359	U	0.558	0.559		0.365	pCi/g	10/18/20 18:42	11/13/20 11:48	1
Thorium 228	0.340		0.0714	0.0797		0.0245	pCi/g	10/18/20 18:42	11/13/20 11:48	1
Uranium-235	0.116	U	0.233	0.234		0.305	pCi/g	10/18/20 18:42	11/13/20 11:48	1
Uranium-238	0.359	U	0.558	0.559		0.365	pCi/g	10/18/20 18:42	11/13/20 11:48	1

Client Sample ID: HPPG-ESU-TU153B-011

Lab Sample ID: 160-39827-11

Date Collected: 10/07/20 12:52

Matrix: Solid

Date Received: 10/09/20 08:55

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Total Beta Strontium	-0.00903	U	0.0601	0.0601	0.160	0.0501	pCi/g	10/26/20 07:37	11/11/20 18:44	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	96.2		40 - 110					10/26/20 07:37	11/11/20 18:44	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.195	U	0.615	0.616		0.376	pCi/g	10/18/20 18:42	11/13/20 11:50	1
Actinium 228	0.439		0.184	0.189		0.0862	pCi/g	10/18/20 18:42	11/13/20 11:50	1
Bismuth-212	0.0245	U	0.656	0.656		0.538	pCi/g	10/18/20 18:42	11/13/20 11:50	1
Bismuth-214	0.380		0.121	0.128		0.0510	pCi/g	10/18/20 18:42	11/13/20 11:50	1
Cesium-137	-0.0371	U	0.0605	0.0606	0.0700	0.0467	pCi/g	10/18/20 18:42	11/13/20 11:50	1
Lead-210	0.731	U	1.38	1.38		0.881	pCi/g	10/18/20 18:42	11/13/20 11:50	1
Lead-212	0.410		0.0877	0.102		0.0441	pCi/g	10/18/20 18:42	11/13/20 11:50	1
Lead-214	0.467		0.105	0.116		0.0392	pCi/g	10/18/20 18:42	11/13/20 11:50	1
Potassium-40	9.92		1.37	1.71		0.271	pCi/g	10/18/20 18:42	11/13/20 11:50	1
Protactinium-231	0.610	U	2.30	2.30		1.87	pCi/g	10/18/20 18:42	11/13/20 11:50	1
Protactinium-234	-0.0356	U	0.209	0.209		0.171	pCi/g	10/18/20 18:42	11/13/20 11:50	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
 SDG: G146599785

Client Sample ID: HPPG-ESU-TU153B-011

Lab Sample ID: 160-39827-11

Date Collected: 10/07/20 12:52

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Radium-226	0.380		0.121	0.128	0.200	0.0510	pCi/g	10/18/20 18:42	11/13/20 11:50	1
Radium-228	0.439		0.184	0.189		0.0862	pCi/g	10/18/20 18:42	11/13/20 11:50	1
Thallium-208	0.163		0.0515	0.0542		0.0202	pCi/g	10/18/20 18:42	11/13/20 11:50	1
Thorium-232	0.439		0.184	0.189		0.0862	pCi/g	10/18/20 18:42	11/13/20 11:50	1
Thorium-234	0.152	U	0.468	0.469		0.375	pCi/g	10/18/20 18:42	11/13/20 11:50	1
Thorium 228	0.410		0.0877	0.102		0.0441	pCi/g	10/18/20 18:42	11/13/20 11:50	1
Uranium-235	0.0843	U	0.221	0.221		0.286	pCi/g	10/18/20 18:42	11/13/20 11:50	1
Uranium-238	0.152	U	0.468	0.469		0.375	pCi/g	10/18/20 18:42	11/13/20 11:50	1

Client Sample ID: HPPG-ESU-TU153B-012

Lab Sample ID: 160-39827-12

Date Collected: 10/07/20 12:58

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.0263	U	0.304	0.304		0.250	pCi/g	10/18/20 18:42	11/13/20 11:46	1
Actinium 228	0.469		0.192	0.198		0.0789	pCi/g	10/18/20 18:42	11/13/20 11:46	1
Bismuth-212	-0.337	U	0.665	0.665		0.521	pCi/g	10/18/20 18:42	11/13/20 11:46	1
Bismuth-214	0.367		0.0971	0.104		0.0448	pCi/g	10/18/20 18:42	11/13/20 11:46	1
Cesium-137	-0.0521	U	0.0840	0.0842	0.0700	0.0666	pCi/g	10/18/20 18:42	11/13/20 11:46	1
Lead-210	1.61		1.07	1.09		0.546	pCi/g	10/18/20 18:42	11/13/20 11:46	1
Lead-212	0.363		0.0729	0.0867		0.0351	pCi/g	10/18/20 18:42	11/13/20 11:46	1
Lead-214	0.355		0.0959	0.103		0.0409	pCi/g	10/18/20 18:42	11/13/20 11:46	1
Potassium-40	7.16		1.07	1.30		0.243	pCi/g	10/18/20 18:42	11/13/20 11:46	1
Protactinium-231	-0.790	U	2.49	2.49		2.03	pCi/g	10/18/20 18:42	11/13/20 11:46	1
Protactinium-234	-0.0785	U	0.225	0.225		0.183	pCi/g	10/18/20 18:42	11/13/20 11:46	1
Radium-226	0.367		0.0971	0.104	0.200	0.0448	pCi/g	10/18/20 18:42	11/13/20 11:46	1
Radium-228	0.469		0.192	0.198		0.0789	pCi/g	10/18/20 18:42	11/13/20 11:46	1
Thallium-208	0.130		0.0386	0.0409		0.0115	pCi/g	10/18/20 18:42	11/13/20 11:46	1
Thorium-232	0.469		0.192	0.198		0.0789	pCi/g	10/18/20 18:42	11/13/20 11:46	1
Thorium-234	0.325	U	0.701	0.702		0.718	pCi/g	10/18/20 18:42	11/13/20 11:46	1
Thorium 228	0.363		0.0729	0.0867		0.0351	pCi/g	10/18/20 18:42	11/13/20 11:46	1
Uranium-235	0.000	U	0.0624	0.0625		0.321	pCi/g	10/18/20 18:42	11/13/20 11:46	1
Uranium-238	0.325	U	0.701	0.702		0.718	pCi/g	10/18/20 18:42	11/13/20 11:46	1

Client Sample ID: HPPG-ESU-TU153B-013

Lab Sample ID: 160-39827-13

Date Collected: 10/07/20 13:05

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.247	U	0.727	0.728		0.444	pCi/g	10/18/20 18:42	11/13/20 11:47	1
Actinium 228	0.684		0.190	0.202		0.0307	pCi/g	10/18/20 18:42	11/13/20 11:47	1
Bismuth-212	0.278	U	0.778	0.779		0.615	pCi/g	10/18/20 18:42	11/13/20 11:47	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
 SDG: G146599785

Client Sample ID: HPPG-ESU-TU153B-013

Lab Sample ID: 160-39827-13

Date Collected: 10/07/20 13:05

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Bismuth-214	0.489		0.135	0.144		0.0538	pCi/g	10/18/20 18:42	11/13/20 11:47	1
Cesium-137	0.00719	U	0.0482	0.0482	0.0700	0.0388	pCi/g	10/18/20 18:42	11/13/20 11:47	1
Lead-210	-0.849	U	1.95	1.95		1.64	pCi/g	10/18/20 18:42	11/13/20 11:47	1
Lead-212	0.397		0.101	0.109		0.0424	pCi/g	10/18/20 18:42	11/13/20 11:47	1
Lead-214	0.571		0.128	0.140		0.0404	pCi/g	10/18/20 18:42	11/13/20 11:47	1
Potassium-40	9.03		1.36	1.64		0.119	pCi/g	10/18/20 18:42	11/13/20 11:47	1
Protactinium-231	0.221	U	1.47	1.47		2.27	pCi/g	10/18/20 18:42	11/13/20 11:47	1
Protactinium-234	-0.105	U	0.315	0.315		0.257	pCi/g	10/18/20 18:42	11/13/20 11:47	1
Radium-226	0.489		0.135	0.144	0.200	0.0538	pCi/g	10/18/20 18:42	11/13/20 11:47	1
Radium-228	0.684		0.190	0.202		0.0307	pCi/g	10/18/20 18:42	11/13/20 11:47	1
Thallium-208	0.150		0.0878	0.0891		0.0388	pCi/g	10/18/20 18:42	11/13/20 11:47	1
Thorium-232	0.684		0.190	0.202		0.0307	pCi/g	10/18/20 18:42	11/13/20 11:47	1
Thorium-234	-0.945	U	0.651	0.659		0.938	pCi/g	10/18/20 18:42	11/13/20 11:47	1
Thorium 228	0.397		0.101	0.109		0.0424	pCi/g	10/18/20 18:42	11/13/20 11:47	1
Uranium-235	0.000	U	0.237	0.237		0.445	pCi/g	10/18/20 18:42	11/13/20 11:47	1
Uranium-238	-0.945	U	0.651	0.659		0.938	pCi/g	10/18/20 18:42	11/13/20 11:47	1

Client Sample ID: HPPG-ESU-TU153B-014

Lab Sample ID: 160-39827-14

Date Collected: 10/07/20 13:13

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.0514	U	0.157	0.157		0.260	pCi/g	10/18/20 18:42	11/13/20 11:52	1
Actinium 228	0.243		0.0873	0.0908		0.0198	pCi/g	10/18/20 18:42	11/13/20 11:52	1
Bismuth-212	0.0137	U	0.496	0.496		0.407	pCi/g	10/18/20 18:42	11/13/20 11:52	1
Bismuth-214	0.329		0.0822	0.0890		0.0311	pCi/g	10/18/20 18:42	11/13/20 11:52	1
Cesium-137	0.0143	U	0.0461	0.0461	0.0700	0.0368	pCi/g	10/18/20 18:42	11/13/20 11:52	1
Lead-210	0.191	U	1.15	1.15		0.939	pCi/g	10/18/20 18:42	11/13/20 11:52	1
Lead-212	0.316		0.0812	0.0909		0.0356	pCi/g	10/18/20 18:42	11/13/20 11:52	1
Lead-214	0.344		0.0948	0.101		0.0390	pCi/g	10/18/20 18:42	11/13/20 11:52	1
Potassium-40	8.78		1.09	1.41		0.0781	pCi/g	10/18/20 18:42	11/13/20 11:52	1
Protactinium-231	0.000	U	0.569	0.569		1.49	pCi/g	10/18/20 18:42	11/13/20 11:52	1
Protactinium-234	0.0936		0.112	0.113		0.0541	pCi/g	10/18/20 18:42	11/13/20 11:52	1
Radium-226	0.329		0.0822	0.0890	0.200	0.0311	pCi/g	10/18/20 18:42	11/13/20 11:52	1
Radium-228	0.243		0.0873	0.0908		0.0198	pCi/g	10/18/20 18:42	11/13/20 11:52	1
Thallium-208	0.137		0.0386	0.0412		0.0101	pCi/g	10/18/20 18:42	11/13/20 11:52	1
Thorium-232	0.243		0.0873	0.0908		0.0198	pCi/g	10/18/20 18:42	11/13/20 11:52	1
Thorium-234	-0.300	U	0.979	0.980		0.800	pCi/g	10/18/20 18:42	11/13/20 11:52	1
Thorium 228	0.316		0.0812	0.0909		0.0356	pCi/g	10/18/20 18:42	11/13/20 11:52	1
Uranium-235	0.000	U	0.149	0.149		0.305	pCi/g	10/18/20 18:42	11/13/20 11:52	1
Uranium-238	-0.300	U	0.979	0.980		0.800	pCi/g	10/18/20 18:42	11/13/20 11:52	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
 SDG: G146599785

Client Sample ID: HPPG-ESU-TU153B-015

Lab Sample ID: 160-39827-15

Date Collected: 10/07/20 13:18

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.0270	U	0.425	0.425		0.289	pCi/g	10/18/20 18:42	11/13/20 11:54	1
Actinium 228	0.165		0.0798	0.0816		0.133	pCi/g	10/18/20 18:42	11/13/20 11:54	1
Bismuth-212	-0.250	U	0.622	0.623		0.489	pCi/g	10/18/20 18:42	11/13/20 11:54	1
Bismuth-214	0.207		0.0778	0.0807		0.0344	pCi/g	10/18/20 18:42	11/13/20 11:54	1
Cesium-137	-0.0243	U	0.0574	0.0574	0.0700	0.0452	pCi/g	10/18/20 18:42	11/13/20 11:54	1
Lead-210	0.656	U	1.27	1.27		0.803	pCi/g	10/18/20 18:42	11/13/20 11:54	1
Lead-212	0.189		0.0648	0.0693		0.0377	pCi/g	10/18/20 18:42	11/13/20 11:54	1
Lead-214	0.387		0.102	0.110		0.0506	pCi/g	10/18/20 18:42	11/13/20 11:54	1
Potassium-40	6.20		1.07	1.24		0.253	pCi/g	10/18/20 18:42	11/13/20 11:54	1
Protactinium-231	-0.410	U	2.27	2.27		1.86	pCi/g	10/18/20 18:42	11/13/20 11:54	1
Protactinium-234	0.0786	U	0.250	0.251		0.204	pCi/g	10/18/20 18:42	11/13/20 11:54	1
Radium-226	0.207		0.0778	0.0807	0.200	0.0344	pCi/g	10/18/20 18:42	11/13/20 11:54	1
Radium-228	0.165		0.0798	0.0816		0.133	pCi/g	10/18/20 18:42	11/13/20 11:54	1
Thallium-208	0.137		0.0563	0.0581		0.0221	pCi/g	10/18/20 18:42	11/13/20 11:54	1
Thorium-232	0.165		0.0798	0.0816		0.133	pCi/g	10/18/20 18:42	11/13/20 11:54	1
Thorium-234	0.158	U	0.448	0.448		0.358	pCi/g	10/18/20 18:42	11/13/20 11:54	1
Thorium 228	0.189		0.0648	0.0693		0.0377	pCi/g	10/18/20 18:42	11/13/20 11:54	1
Uranium-235	0.000	U	0.105	0.105		0.358	pCi/g	10/18/20 18:42	11/13/20 11:54	1
Uranium-238	0.158	U	0.448	0.448		0.358	pCi/g	10/18/20 18:42	11/13/20 11:54	1

Client Sample ID: HPPG-ESU-TU153B-016

Lab Sample ID: 160-39827-16

Date Collected: 10/07/20 13:20

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.438	U	0.833	0.835		0.503	pCi/g	10/18/20 18:42	11/13/20 11:55	1
Actinium 228	0.158	U	0.261	0.262		0.182	pCi/g	10/18/20 18:42	11/13/20 11:55	1
Bismuth-212	0.354	U	0.636	0.638		0.478	pCi/g	10/18/20 18:42	11/13/20 11:55	1
Bismuth-214	0.467		0.177	0.185		0.0719	pCi/g	10/18/20 18:42	11/13/20 11:55	1
Cesium-137	0.000177	U	0.0757	0.0757	0.0700	0.0623	pCi/g	10/18/20 18:42	11/13/20 11:55	1
Lead-210	1.81		1.74	1.76		1.07	pCi/g	10/18/20 18:42	11/13/20 11:55	1
Lead-212	0.429		0.100	0.112		0.0517	pCi/g	10/18/20 18:42	11/13/20 11:55	1
Lead-214	0.593		0.122	0.140		0.0564	pCi/g	10/18/20 18:42	11/13/20 11:55	1
Potassium-40	9.94		1.55	1.93		0.281	pCi/g	10/18/20 18:42	11/13/20 11:55	1
Protactinium-231	0.615	U	2.10	2.10		2.29	pCi/g	10/18/20 18:42	11/13/20 11:55	1
Protactinium-234	0.109	U	0.330	0.331		0.269	pCi/g	10/18/20 18:42	11/13/20 11:55	1
Radium-226	0.467		0.177	0.185	0.200	0.0719	pCi/g	10/18/20 18:42	11/13/20 11:55	1
Radium-228	0.158	U	0.261	0.262		0.182	pCi/g	10/18/20 18:42	11/13/20 11:55	1
Thallium-208	0.224		0.0745	0.0788		0.0297	pCi/g	10/18/20 18:42	11/13/20 11:55	1
Thorium-232	0.158	U	0.261	0.262		0.182	pCi/g	10/18/20 18:42	11/13/20 11:55	1
Thorium-234	0.997		0.595	0.608		0.416	pCi/g	10/18/20 18:42	11/13/20 11:55	1
Thorium 228	0.429		0.100	0.112		0.0517	pCi/g	10/18/20 18:42	11/13/20 11:55	1
Uranium-235	-0.234	U	0.338	0.339		0.542	pCi/g	10/18/20 18:42	11/13/20 11:55	1
Uranium-238	0.997		0.595	0.608		0.416	pCi/g	10/18/20 18:42	11/13/20 11:55	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
 SDG: G146599785

Client Sample ID: HPPG-ESU-TU153B-017

Lab Sample ID: 160-39827-17

Date Collected: 10/07/20 13:22

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.276	U	0.554	0.555		0.389	pCi/g	10/18/20 18:42	11/13/20 14:38	1
Actinium 228	0.477		0.259	0.263		0.107	pCi/g	10/18/20 18:42	11/13/20 14:38	1
Bismuth-212	-0.302	U	0.996	0.997		0.797	pCi/g	10/18/20 18:42	11/13/20 14:38	1
Bismuth-214	0.393		0.118	0.125		0.0394	pCi/g	10/18/20 18:42	11/13/20 14:38	1
Cesium-137	-0.000665	U	0.0733	0.0733	0.0700	0.0604	pCi/g	10/18/20 18:42	11/13/20 14:38	1
Lead-210	1.73		1.63	1.64		0.994	pCi/g	10/18/20 18:42	11/13/20 14:38	1
Lead-212	0.419		0.0840	0.0947		0.0360	pCi/g	10/18/20 18:42	11/13/20 14:38	1
Lead-214	0.392		0.111	0.118		0.0550	pCi/g	10/18/20 18:42	11/13/20 14:38	1
Potassium-40	9.66		1.57	1.85		0.218	pCi/g	10/18/20 18:42	11/13/20 14:38	1
Protactinium-231	0.000	U	0.620	0.620		2.16	pCi/g	10/18/20 18:42	11/13/20 14:38	1
Protactinium-234	0.0275	U	0.0548	0.0549		0.227	pCi/g	10/18/20 18:42	11/13/20 14:38	1
Radium-226	0.393		0.118	0.125	0.200	0.0394	pCi/g	10/18/20 18:42	11/13/20 14:38	1
Radium-228	0.477		0.259	0.263		0.107	pCi/g	10/18/20 18:42	11/13/20 14:38	1
Thallium-208	0.157		0.0517	0.0541		0.0148	pCi/g	10/18/20 18:42	11/13/20 14:38	1
Thorium-232	0.477		0.259	0.263		0.107	pCi/g	10/18/20 18:42	11/13/20 14:38	1
Thorium-234	0.460		0.532	0.534		0.412	pCi/g	10/18/20 18:42	11/13/20 14:38	1
Thorium 228	0.419		0.0840	0.0947		0.0360	pCi/g	10/18/20 18:42	11/13/20 14:38	1
Uranium-235	0.131	U	0.383	0.383		0.388	pCi/g	10/18/20 18:42	11/13/20 14:38	1
Uranium-238	0.460		0.532	0.534		0.412	pCi/g	10/18/20 18:42	11/13/20 14:38	1

Client Sample ID: HPPG-ESU-TU153B-018

Lab Sample ID: 160-39827-18

Date Collected: 10/07/20 13:29

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.222	U	0.462	0.462		0.275	pCi/g	10/18/20 18:42	11/13/20 14:40	1
Actinium 228	0.232		0.189	0.190		0.114	pCi/g	10/18/20 18:42	11/13/20 14:40	1
Bismuth-212	-0.268	U	0.902	0.902		0.723	pCi/g	10/18/20 18:42	11/13/20 14:40	1
Bismuth-214	0.326		0.108	0.113		0.0448	pCi/g	10/18/20 18:42	11/13/20 14:40	1
Cesium-137	-0.0163	U	0.0581	0.0582	0.0700	0.0463	pCi/g	10/18/20 18:42	11/13/20 14:40	1
Lead-210	1.31		1.38	1.39		0.881	pCi/g	10/18/20 18:42	11/13/20 14:40	1
Lead-212	0.455		0.0894	0.107		0.0382	pCi/g	10/18/20 18:42	11/13/20 14:40	1
Lead-214	0.401		0.103	0.111		0.0486	pCi/g	10/18/20 18:42	11/13/20 14:40	1
Potassium-40	7.57		1.27	1.48		0.296	pCi/g	10/18/20 18:42	11/13/20 14:40	1
Protactinium-231	0.598	U	1.83	1.83		2.00	pCi/g	10/18/20 18:42	11/13/20 14:40	1
Protactinium-234	-0.101	U	0.248	0.248		0.201	pCi/g	10/18/20 18:42	11/13/20 14:40	1
Radium-226	0.326		0.108	0.113	0.200	0.0448	pCi/g	10/18/20 18:42	11/13/20 14:40	1
Radium-228	0.232		0.189	0.190		0.114	pCi/g	10/18/20 18:42	11/13/20 14:40	1
Thallium-208	0.172		0.0711	0.0734		0.0302	pCi/g	10/18/20 18:42	11/13/20 14:40	1
Thorium-232	0.232		0.189	0.190		0.114	pCi/g	10/18/20 18:42	11/13/20 14:40	1
Thorium-234	-0.749	U	0.570	0.576		0.805	pCi/g	10/18/20 18:42	11/13/20 14:40	1
Thorium 228	0.455		0.0894	0.107		0.0382	pCi/g	10/18/20 18:42	11/13/20 14:40	1
Uranium-235	-0.0172	U	0.429	0.429		0.290	pCi/g	10/18/20 18:42	11/13/20 14:40	1
Uranium-238	-0.749	U	0.570	0.576		0.805	pCi/g	10/18/20 18:42	11/13/20 14:40	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
 SDG: G146599785

Client Sample ID: HPPG-ESU-TU153B-019

Lab Sample ID: 160-39827-19

Date Collected: 10/07/20 13:31

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.0690	U	0.249	0.249		0.306	pCi/g	10/18/20 18:42	11/13/20 14:42	1
Actinium 228	0.292		0.183	0.185		0.0953	pCi/g	10/18/20 18:42	11/13/20 14:42	1
Bismuth-212	-0.239	U	0.743	0.743		0.595	pCi/g	10/18/20 18:42	11/13/20 14:42	1
Bismuth-214	0.369		0.113	0.119		0.0481	pCi/g	10/18/20 18:42	11/13/20 14:42	1
Cesium-137	-0.0157	U	0.0602	0.0602	0.0700	0.0485	pCi/g	10/18/20 18:42	11/13/20 14:42	1
Lead-210	-0.380	U	1.19	1.19		0.963	pCi/g	10/18/20 18:42	11/13/20 14:42	1
Lead-212	0.408		0.0768	0.0932		0.0356	pCi/g	10/18/20 18:42	11/13/20 14:42	1
Lead-214	0.432		0.101	0.111		0.0434	pCi/g	10/18/20 18:42	11/13/20 14:42	1
Potassium-40	9.15		1.22	1.54		0.249	pCi/g	10/18/20 18:42	11/13/20 14:42	1
Protactinium-231	-0.812	U	2.52	2.52		2.05	pCi/g	10/18/20 18:42	11/13/20 14:42	1
Protactinium-234	0.0207	U	0.0434	0.0434		0.195	pCi/g	10/18/20 18:42	11/13/20 14:42	1
Radium-226	0.369		0.113	0.119	0.200	0.0481	pCi/g	10/18/20 18:42	11/13/20 14:42	1
Radium-228	0.292		0.183	0.185		0.0953	pCi/g	10/18/20 18:42	11/13/20 14:42	1
Thallium-208	0.176		0.0463	0.0498		0.0128	pCi/g	10/18/20 18:42	11/13/20 14:42	1
Thorium-232	0.292		0.183	0.185		0.0953	pCi/g	10/18/20 18:42	11/13/20 14:42	1
Thorium-234	0.350	U	0.585	0.586		0.520	pCi/g	10/18/20 18:42	11/13/20 14:42	1
Thorium 228	0.408		0.0768	0.0932		0.0356	pCi/g	10/18/20 18:42	11/13/20 14:42	1
Uranium-235	0.0232	U	0.0365	0.0366		0.372	pCi/g	10/18/20 18:42	11/13/20 14:42	1
Uranium-238	0.350	U	0.585	0.586		0.520	pCi/g	10/18/20 18:42	11/13/20 14:42	1

Client Sample ID: HPPG-ESU-TU153B-020

Lab Sample ID: 160-39827-20

Date Collected: 10/07/20 13:33

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.0437	U	0.0725	0.0726		0.355	pCi/g	10/18/20 18:42	11/13/20 14:43	1
Actinium 228	0.165		0.222	0.223		0.133	pCi/g	10/18/20 18:42	11/13/20 14:43	1
Bismuth-212	-0.319	U	0.967	0.968		0.774	pCi/g	10/18/20 18:42	11/13/20 14:43	1
Bismuth-214	0.278		0.111	0.115		0.0519	pCi/g	10/18/20 18:42	11/13/20 14:43	1
Cesium-137	0.0276	U	0.0516	0.0516	0.0700	0.0393	pCi/g	10/18/20 18:42	11/13/20 14:43	1
Lead-210	-0.931	U	1.82	1.82		1.53	pCi/g	10/18/20 18:42	11/13/20 14:43	1
Lead-212	0.376		0.0817	0.0906		0.0360	pCi/g	10/18/20 18:42	11/13/20 14:43	1
Lead-214	0.396		0.120	0.126		0.0543	pCi/g	10/18/20 18:42	11/13/20 14:43	1
Potassium-40	8.41		1.29	1.54		0.115	pCi/g	10/18/20 18:42	11/13/20 14:43	1
Protactinium-231	0.000	U	0.160	0.160		2.13	pCi/g	10/18/20 18:42	11/13/20 14:43	1
Protactinium-234	0.0627	U	0.190	0.191		0.211	pCi/g	10/18/20 18:42	11/13/20 14:43	1
Radium-226	0.278		0.111	0.115	0.200	0.0519	pCi/g	10/18/20 18:42	11/13/20 14:43	1
Radium-228	0.165		0.222	0.223		0.133	pCi/g	10/18/20 18:42	11/13/20 14:43	1
Thallium-208	0.139		0.0627	0.0643		0.0266	pCi/g	10/18/20 18:42	11/13/20 14:43	1
Thorium-232	0.165		0.222	0.223		0.133	pCi/g	10/18/20 18:42	11/13/20 14:43	1
Thorium-234	-0.551	U	0.734	0.736		0.791	pCi/g	10/18/20 18:42	11/13/20 14:43	1
Thorium 228	0.376		0.0817	0.0906		0.0360	pCi/g	10/18/20 18:42	11/13/20 14:43	1
Uranium-235	0.125	U	0.251	0.252		0.196	pCi/g	10/18/20 18:42	11/13/20 14:43	1
Uranium-238	-0.551	U	0.734	0.736		0.791	pCi/g	10/18/20 18:42	11/13/20 14:43	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
 SDG: G146599785

Client Sample ID: HPPG-ESU-TU153B-021

Lab Sample ID: 160-39827-21

Date Collected: 10/07/20 13:35

Matrix: Solid

Date Received: 10/09/20 08:55

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	-0.00521	U	0.0586	0.0586	0.160	0.0486	pCi/g	10/26/20 07:37	11/11/20 18:44	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	92.1		40 - 110					10/26/20 07:37	11/11/20 18:44	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-227	0.139	U	0.303	0.303		0.263	pCi/g	10/18/20 19:20	11/13/20 18:29	1
Actinium 228	0.493		0.139	0.148		0.0357	pCi/g	10/18/20 19:20	11/13/20 18:29	1
Bismuth-212	0.000	U	0.426	0.426		0.420	pCi/g	10/18/20 19:20	11/13/20 18:29	1
Bismuth-214	0.337		0.0908	0.0973		0.0356	pCi/g	10/18/20 19:20	11/13/20 18:29	1
Cesium-137	0.00235	U	0.0481	0.0482	0.0700	0.0395	pCi/g	10/18/20 19:20	11/13/20 18:29	1
Lead-210	-0.629	U	1.39	1.39		1.12	pCi/g	10/18/20 19:20	11/13/20 18:29	1
Lead-212	0.478		0.0737	0.0962		0.0276	pCi/g	10/18/20 19:20	11/13/20 18:29	1
Lead-214	0.451		0.0898	0.101		0.0451	pCi/g	10/18/20 19:20	11/13/20 18:29	1
Potassium-40	8.47		1.12	1.42		0.228	pCi/g	10/18/20 19:20	11/13/20 18:29	1
Protactinium-231	0.000	U	0.549	0.549		1.63	pCi/g	10/18/20 19:20	11/13/20 18:29	1
Protactinium-234	-0.0247	U	0.0427	0.0428		0.202	pCi/g	10/18/20 19:20	11/13/20 18:29	1
Radium-226	0.337		0.0908	0.0973	0.200	0.0356	pCi/g	10/18/20 19:20	11/13/20 18:29	1
Radium-228	0.493		0.139	0.148		0.0357	pCi/g	10/18/20 19:20	11/13/20 18:29	1
Thallium-208	0.143		0.0470	0.0493		0.0179	pCi/g	10/18/20 19:20	11/13/20 18:29	1
Thorium-232	0.493		0.139	0.148		0.0357	pCi/g	10/18/20 19:20	11/13/20 18:29	1
Thorium-234	0.117	U	0.386	0.387		0.803	pCi/g	10/18/20 19:20	11/13/20 18:29	1
Thorium 228	0.478		0.0737	0.0962		0.0276	pCi/g	10/18/20 19:20	11/13/20 18:29	1
Uranium-235	0.138	U	0.409	0.409		0.333	pCi/g	10/18/20 19:20	11/13/20 18:29	1
Uranium-238	0.117	U	0.386	0.387		0.803	pCi/g	10/18/20 19:20	11/13/20 18:29	1

Client Sample ID: HPPG-ESU-TU153B-022

Lab Sample ID: 160-39827-22

Date Collected: 10/07/20 13:38

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-227	0.148	U	0.538	0.538		0.327	pCi/g	10/18/20 19:20	11/13/20 18:30	1
Actinium 228	0.541		0.154	0.163		0.0685	pCi/g	10/18/20 19:20	11/13/20 18:30	1
Bismuth-212	-0.0429	U	0.733	0.733		0.600	pCi/g	10/18/20 19:20	11/13/20 18:30	1
Bismuth-214	0.118	U	0.117	0.117		0.193	pCi/g	10/18/20 19:20	11/13/20 18:30	1
Cesium-137	-0.0450	U	0.0747	0.0748	0.0700	0.0579	pCi/g	10/18/20 19:20	11/13/20 18:30	1
Lead-210	0.616	U	1.65	1.65		1.32	pCi/g	10/18/20 19:20	11/13/20 18:30	1
Lead-212	0.321		0.0838	0.0902		0.0439	pCi/g	10/18/20 19:20	11/13/20 18:30	1
Lead-214	0.372		0.112	0.119		0.0467	pCi/g	10/18/20 19:20	11/13/20 18:30	1
Potassium-40	6.34		1.29	1.44		0.291	pCi/g	10/18/20 19:20	11/13/20 18:30	1
Protactinium-231	-0.181	U	2.69	2.69		2.21	pCi/g	10/18/20 19:20	11/13/20 18:30	1
Protactinium-234	0.0354	U	0.0712	0.0713		0.256	pCi/g	10/18/20 19:20	11/13/20 18:30	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
 SDG: G146599785

Client Sample ID: HPPG-ESU-TU153B-022

Lab Sample ID: 160-39827-22

Date Collected: 10/07/20 13:38

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Radium-226	0.118	U	0.117	0.117	0.200	0.193	pCi/g	10/18/20 19:20	11/13/20 18:30	1
Radium-228	0.541		0.154	0.163		0.0685	pCi/g	10/18/20 19:20	11/13/20 18:30	1
Thallium-208	0.153		0.0450	0.0476		0.00760	pCi/g	10/18/20 19:20	11/13/20 18:30	1
Thorium-232	0.541		0.154	0.163		0.0685	pCi/g	10/18/20 19:20	11/13/20 18:30	1
Thorium-234	0.460	U	0.653	0.655		0.470	pCi/g	10/18/20 19:20	11/13/20 18:30	1
Thorium 228	0.321		0.0838	0.0902		0.0439	pCi/g	10/18/20 19:20	11/13/20 18:30	1
Uranium-235	0.200	U	0.386	0.387		0.396	pCi/g	10/18/20 19:20	11/13/20 18:30	1
Uranium-238	0.460	U	0.653	0.655		0.470	pCi/g	10/18/20 19:20	11/13/20 18:30	1

Client Sample ID: HPPG-ESU-TU153B-023

Lab Sample ID: 160-39827-23

Date Collected: 10/07/20 13:41

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.00781	U	0.0396	0.0396		0.273	pCi/g	10/18/20 19:20	11/13/20 18:32	1
Actinium 228	0.407		0.119	0.126		0.0202	pCi/g	10/18/20 19:20	11/13/20 18:32	1
Bismuth-212	1.40		0.396	0.422		0.0653	pCi/g	10/18/20 19:20	11/13/20 18:32	1
Bismuth-214	0.458		0.109	0.119		0.0376	pCi/g	10/18/20 19:20	11/13/20 18:32	1
Cesium-137	-0.0103	U	0.0578	0.0578	0.0700	0.0469	pCi/g	10/18/20 19:20	11/13/20 18:32	1
Lead-210	-0.389	U	1.23	1.23		1.00	pCi/g	10/18/20 19:20	11/13/20 18:32	1
Lead-212	0.439		0.0721	0.0918		0.0303	pCi/g	10/18/20 19:20	11/13/20 18:32	1
Lead-214	0.488		0.107	0.119		0.0429	pCi/g	10/18/20 19:20	11/13/20 18:32	1
Potassium-40	8.35		1.07	1.37		0.0797	pCi/g	10/18/20 19:20	11/13/20 18:32	1
Protactinium-231	0.535	U	1.67	1.67		1.36	pCi/g	10/18/20 19:20	11/13/20 18:32	1
Protactinium-234	0.0592	U	0.0798	0.0800		0.203	pCi/g	10/18/20 19:20	11/13/20 18:32	1
Radium-226	0.458		0.109	0.119	0.200	0.0376	pCi/g	10/18/20 19:20	11/13/20 18:32	1
Radium-228	0.407		0.119	0.126		0.0202	pCi/g	10/18/20 19:20	11/13/20 18:32	1
Thallium-208	0.150		0.0391	0.0421		0.00902	pCi/g	10/18/20 19:20	11/13/20 18:32	1
Thorium-232	0.407		0.119	0.126		0.0202	pCi/g	10/18/20 19:20	11/13/20 18:32	1
Thorium-234	0.527		0.324	0.329		0.277	pCi/g	10/18/20 19:20	11/13/20 18:32	1
Thorium 228	0.439		0.0721	0.0918		0.0303	pCi/g	10/18/20 19:20	11/13/20 18:32	1
Uranium-235	0.0956	U	0.173	0.173		0.359	pCi/g	10/18/20 19:20	11/13/20 18:32	1
Uranium-238	0.527		0.324	0.329		0.277	pCi/g	10/18/20 19:20	11/13/20 18:32	1

Client Sample ID: HPPG-ESU-TU153B-024

Lab Sample ID: 160-39827-24

Date Collected: 10/07/20 13:44

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.321	U	0.573	0.575		0.370	pCi/g	10/18/20 19:20	11/13/20 18:34	1
Actinium 228	0.412		0.153	0.159		0.132	pCi/g	10/18/20 19:20	11/13/20 18:34	1
Bismuth-212	0.000	U	0.590	0.590		0.595	pCi/g	10/18/20 19:20	11/13/20 18:34	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
 SDG: G146599785

Client Sample ID: HPPG-ESU-TU153B-024

Lab Sample ID: 160-39827-24

Date Collected: 10/07/20 13:44

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Bismuth-214	0.348		0.122	0.128		0.0536	pCi/g	10/18/20 19:20	11/13/20 18:34	1
Cesium-137	-0.0150	U	0.0549	0.0549	0.0700	0.0438	pCi/g	10/18/20 19:20	11/13/20 18:34	1
Lead-210	0.990		1.20	1.21		0.783	pCi/g	10/18/20 19:20	11/13/20 18:34	1
Lead-212	0.399		0.0878	0.102		0.0442	pCi/g	10/18/20 19:20	11/13/20 18:34	1
Lead-214	0.486		0.114	0.125		0.0606	pCi/g	10/18/20 19:20	11/13/20 18:34	1
Potassium-40	8.96		1.33	1.61		0.276	pCi/g	10/18/20 19:20	11/13/20 18:34	1
Protactinium-231	0.463	U	1.71	1.72		1.91	pCi/g	10/18/20 19:20	11/13/20 18:34	1
Protactinium-234	-0.0906	U	0.289	0.289		0.235	pCi/g	10/18/20 19:20	11/13/20 18:34	1
Radium-226	0.348		0.122	0.128	0.200	0.0536	pCi/g	10/18/20 19:20	11/13/20 18:34	1
Radium-228	0.412		0.153	0.159		0.132	pCi/g	10/18/20 19:20	11/13/20 18:34	1
Thallium-208	0.132		0.0490	0.0509		0.0196	pCi/g	10/18/20 19:20	11/13/20 18:34	1
Thorium-232	0.412		0.153	0.159		0.132	pCi/g	10/18/20 19:20	11/13/20 18:34	1
Thorium-234	0.0963	U	0.544	0.544		0.441	pCi/g	10/18/20 19:20	11/13/20 18:34	1
Thorium 228	0.399		0.0878	0.102		0.0442	pCi/g	10/18/20 19:20	11/13/20 18:34	1
Uranium-235	0.135	U	0.425	0.426		0.346	pCi/g	10/18/20 19:20	11/13/20 18:34	1
Uranium-238	0.0963	U	0.544	0.544		0.441	pCi/g	10/18/20 19:20	11/13/20 18:34	1

Client Sample ID: HPPG-ESU-TU153B-025

Lab Sample ID: 160-39827-25

Date Collected: 10/07/20 13:49

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.137	U	0.386	0.386		0.363	pCi/g	10/18/20 19:20	11/13/20 19:28	1
Actinium 228	0.621		0.214	0.223		0.0823	pCi/g	10/18/20 19:20	11/13/20 19:28	1
Bismuth-212	0.364	U	0.844	0.845		0.658	pCi/g	10/18/20 19:20	11/13/20 19:28	1
Bismuth-214	0.494		0.141	0.150		0.0455	pCi/g	10/18/20 19:20	11/13/20 19:28	1
Cesium-137	0.00915	U	0.0791	0.0791	0.0700	0.0643	pCi/g	10/18/20 19:20	11/13/20 19:28	1
Lead-210	1.86		1.70	1.72		1.04	pCi/g	10/18/20 19:20	11/13/20 19:28	1
Lead-212	0.488		0.101	0.113		0.0506	pCi/g	10/18/20 19:20	11/13/20 19:28	1
Lead-214	0.587		0.122	0.136		0.0451	pCi/g	10/18/20 19:20	11/13/20 19:28	1
Potassium-40	8.80		1.57	1.80		0.236	pCi/g	10/18/20 19:20	11/13/20 19:28	1
Protactinium-231	0.255	U	1.47	1.47		2.27	pCi/g	10/18/20 19:20	11/13/20 19:28	1
Protactinium-234	0.162	U	0.100	0.101		0.237	pCi/g	10/18/20 19:20	11/13/20 19:28	1
Radium-226	0.494		0.141	0.150	0.200	0.0455	pCi/g	10/18/20 19:20	11/13/20 19:28	1
Radium-228	0.621		0.214	0.223		0.0823	pCi/g	10/18/20 19:20	11/13/20 19:28	1
Thallium-208	0.188		0.0650	0.0678		0.0237	pCi/g	10/18/20 19:20	11/13/20 19:28	1
Thorium-232	0.621		0.214	0.223		0.0823	pCi/g	10/18/20 19:20	11/13/20 19:28	1
Thorium-234	0.0743	U	0.126	0.126		0.579	pCi/g	10/18/20 19:20	11/13/20 19:28	1
Thorium 228	0.488		0.101	0.113		0.0506	pCi/g	10/18/20 19:20	11/13/20 19:28	1
Uranium-235	-0.218	U	0.418	0.418		0.457	pCi/g	10/18/20 19:20	11/13/20 19:28	1
Uranium-238	0.0743	U	0.126	0.126		0.579	pCi/g	10/18/20 19:20	11/13/20 19:28	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
 SDG: G146599785

Client Sample ID: HPPG-F-007

Lab Sample ID: 160-39827-26

Date Collected: 10/07/20 10:55

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.220	U	0.603	0.603		0.367	pCi/g	10/18/20 19:20	11/13/20 19:31	1
Actinium 228	0.481		0.149	0.157		0.0265	pCi/g	10/18/20 19:20	11/13/20 19:31	1
Bismuth-212	-0.382	U	0.816	0.817		0.643	pCi/g	10/18/20 19:20	11/13/20 19:31	1
Bismuth-214	0.344		0.114	0.120		0.0447	pCi/g	10/18/20 19:20	11/13/20 19:31	1
Cesium-137	0.00304	U	0.0612	0.0612	0.0700	0.0502	pCi/g	10/18/20 19:20	11/13/20 19:31	1
Lead-210	0.538	U	1.29	1.29		0.859	pCi/g	10/18/20 19:20	11/13/20 19:31	1
Lead-212	0.489		0.0923	0.112		0.0434	pCi/g	10/18/20 19:20	11/13/20 19:31	1
Lead-214	0.399		0.118	0.125		0.0508	pCi/g	10/18/20 19:20	11/13/20 19:31	1
Potassium-40	8.64		1.28	1.56		0.271	pCi/g	10/18/20 19:20	11/13/20 19:31	1
Protactinium-231	0.000	U	0.617	0.617		2.19	pCi/g	10/18/20 19:20	11/13/20 19:31	1
Protactinium-234	-0.0226	U	0.0421	0.0422		0.184	pCi/g	10/18/20 19:20	11/13/20 19:31	1
Radium-226	0.344		0.114	0.120	0.200	0.0447	pCi/g	10/18/20 19:20	11/13/20 19:31	1
Radium-228	0.481		0.149	0.157		0.0265	pCi/g	10/18/20 19:20	11/13/20 19:31	1
Thallium-208	0.123		0.0792	0.0802		0.0372	pCi/g	10/18/20 19:20	11/13/20 19:31	1
Thorium-232	0.481		0.149	0.157		0.0265	pCi/g	10/18/20 19:20	11/13/20 19:31	1
Thorium-234	0.164	U	0.450	0.450		0.359	pCi/g	10/18/20 19:20	11/13/20 19:31	1
Thorium 228	0.489		0.0923	0.112		0.0434	pCi/g	10/18/20 19:20	11/13/20 19:31	1
Uranium-235	0.180	U	0.264	0.265		0.239	pCi/g	10/18/20 19:20	11/13/20 19:31	1
Uranium-238	0.164	U	0.450	0.450		0.359	pCi/g	10/18/20 19:20	11/13/20 19:31	1

Client Sample ID: HPPG-F-008

Lab Sample ID: 160-39827-27

Date Collected: 10/07/20 13:13

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.145	U	0.376	0.376		0.272	pCi/g	10/18/20 19:20	11/13/20 19:27	1
Actinium 228	0.261		0.128	0.130		0.0903	pCi/g	10/18/20 19:20	11/13/20 19:27	1
Bismuth-212	0.241	U	0.534	0.534		0.417	pCi/g	10/18/20 19:20	11/13/20 19:27	1
Bismuth-214	0.401		0.0897	0.0989		0.0309	pCi/g	10/18/20 19:20	11/13/20 19:27	1
Cesium-137	0.0170	U	0.0374	0.0374	0.0700	0.0289	pCi/g	10/18/20 19:20	11/13/20 19:27	1
Lead-210	-0.171	U	1.32	1.32		1.08	pCi/g	10/18/20 19:20	11/13/20 19:27	1
Lead-212	0.323		0.0686	0.0803		0.0337	pCi/g	10/18/20 19:20	11/13/20 19:27	1
Lead-214	0.339		0.0921	0.0986		0.0384	pCi/g	10/18/20 19:20	11/13/20 19:27	1
Potassium-40	9.10		1.18	1.51		0.236	pCi/g	10/18/20 19:20	11/13/20 19:27	1
Protactinium-231	-0.770	U	2.38	2.38		1.94	pCi/g	10/18/20 19:20	11/13/20 19:27	1
Protactinium-234	-0.0131	U	0.0256	0.0256		0.194	pCi/g	10/18/20 19:20	11/13/20 19:27	1
Radium-226	0.401		0.0897	0.0989	0.200	0.0309	pCi/g	10/18/20 19:20	11/13/20 19:27	1
Radium-228	0.261		0.128	0.130		0.0903	pCi/g	10/18/20 19:20	11/13/20 19:27	1
Thallium-208	0.125		0.0391	0.0412		0.0118	pCi/g	10/18/20 19:20	11/13/20 19:27	1
Thorium-232	0.261		0.128	0.130		0.0903	pCi/g	10/18/20 19:20	11/13/20 19:27	1
Thorium-234	0.171	U	0.390	0.390		0.794	pCi/g	10/18/20 19:20	11/13/20 19:27	1
Thorium 228	0.323		0.0686	0.0803		0.0337	pCi/g	10/18/20 19:20	11/13/20 19:27	1
Uranium-235	0.000	U	0.148	0.148		0.347	pCi/g	10/18/20 19:20	11/13/20 19:27	1
Uranium-238	0.171	U	0.390	0.390		0.794	pCi/g	10/18/20 19:20	11/13/20 19:27	1

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
 SDG: G146599785

Method: 905.0 - Total Beta Strontium (GFPC)

Lab Sample ID: MB 160-486247/24-A
Matrix: Solid
Analysis Batch: 488625

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 486247

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Total Beta Strontium	0.05901		0.0645	0.0646	0.160	0.0486	pCi/g	10/20/20 07:09	11/09/20 16:51	1
Carrier	MB	MB	Limits				Prepared		Analyzed	Dil Fac
Sr Carrier	%Yield	Qualifier	40 - 110				10/20/20 07:09		11/09/20 16:51	1
	94.2									

Lab Sample ID: LCS 160-486247/1-A
Matrix: Solid
Analysis Batch: 488624

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 486247

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits	
				Uncert. (2σ+/-)						
Total Beta Strontium	7.78	6.438		0.528	0.160	0.0457	pCi/g	83	75 - 125	
Carrier	LCS	LCS	Limits				Prepared		Analyzed	Dil Fac
Sr Carrier	%Yield	Qualifier	40 - 110				10/20/20 07:09		11/09/20 16:51	1
	96.5									

Lab Sample ID: MB 160-486707/15-A
Matrix: Solid
Analysis Batch: 488917

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 486707

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Total Beta Strontium	0.007957	U	0.0569	0.0569	0.160	0.0461	pCi/g	10/26/20 07:37	11/11/20 18:45	1
Carrier	MB	MB	Limits				Prepared		Analyzed	Dil Fac
Sr Carrier	%Yield	Qualifier	40 - 110				10/26/20 07:37		11/11/20 18:45	1
	96.1									

Lab Sample ID: LCS 160-486707/1-A
Matrix: Solid
Analysis Batch: 488917

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 486707

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits	
				Uncert. (2σ+/-)						
Total Beta Strontium	7.78	6.595		0.543	0.160	0.0537	pCi/g	85	75 - 125	
Carrier	LCS	LCS	Limits				Prepared		Analyzed	Dil Fac
Sr Carrier	%Yield	Qualifier	40 - 110				10/26/20 07:37		11/11/20 18:45	1
	91.7									

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
 SDG: G146599785

Method: 905.0 - Total Beta Strontium (GFPC) (Continued)

Lab Sample ID: 160-39827-11 DU
Matrix: Solid
Analysis Batch: 488917

Client Sample ID: HPPG-ESU-TU153B-011
Prep Type: Total/NA
Prep Batch: 486707

Analyte	Sample	Sample	DU	DU	Total	LOQ	DLC	Unit	RER	RER	Limit
	Result	Qual	Result	Qual	Uncert. (2σ+/-)						
Total Beta Strontium	-0.00903	U	-0.03089	U	0.0607	0.160	0.0523	pCi/g		0.18	1
Carrier	%Yield	DU	DU	Qualifier	Limits						
Sr Carrier	93.8				40 - 110						

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-486023/1-A
Matrix: Solid
Analysis Batch: 489008

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 486023

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil	Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)							
Actinium-227	-0.1769	U	0.424	0.425		0.242	pCi/g	10/18/20 18:42	11/13/20 09:50		1
Actinium 228	0.02101	U	0.129	0.129		0.0625	pCi/g	10/18/20 18:42	11/13/20 09:50		1
Bismuth-212	0.0000	U	0.190	0.190		0.239	pCi/g	10/18/20 18:42	11/13/20 09:50		1
Bismuth-214	-0.06374	U	0.0881	0.0884		0.123	pCi/g	10/18/20 18:42	11/13/20 09:50		1
Cesium-137	0.02344	U	0.0455	0.0456	0.0700	0.0347	pCi/g	10/18/20 18:42	11/13/20 09:50		1
Lead-210	-0.4488	U	0.864	0.865		0.672	pCi/g	10/18/20 18:42	11/13/20 09:50		1
Lead-212	-0.02759	U	0.0633	0.0634		0.0499	pCi/g	10/18/20 18:42	11/13/20 09:50		1
Lead-214	-0.1044	U	0.0540	0.0550		0.0874	pCi/g	10/18/20 18:42	11/13/20 09:50		1
Potassium-40	0.04732	U	0.568	0.568		0.270	pCi/g	10/18/20 18:42	11/13/20 09:50		1
Protactinium-231	0.0000	U	0.503	0.503		1.33	pCi/g	10/18/20 18:42	11/13/20 09:50		1
Protactinium-234	-0.06646	U	0.188	0.188		0.152	pCi/g	10/18/20 18:42	11/13/20 09:50		1
Radium-226	-0.06374	U	0.0881	0.0884	0.200	0.123	pCi/g	10/18/20 18:42	11/13/20 09:50		1
Radium-228	0.02101	U	0.129	0.129		0.0625	pCi/g	10/18/20 18:42	11/13/20 09:50		1
Thallium-208	-0.01173	U	0.0480	0.0480		0.0256	pCi/g	10/18/20 18:42	11/13/20 09:50		1
Thorium-232	0.02101	U	0.129	0.129		0.0625	pCi/g	10/18/20 18:42	11/13/20 09:50		1
Thorium-234	0.0000	U	0.0848	0.0848		0.625	pCi/g	10/18/20 18:42	11/13/20 09:50		1
Thorium 228	-0.02759	U	0.0633	0.0634		0.0499	pCi/g	10/18/20 18:42	11/13/20 09:50		1
Uranium-235	0.03052	U	0.0895	0.0896		0.268	pCi/g	10/18/20 18:42	11/13/20 09:50		1
Uranium-238	0.0000	U	0.0848	0.0848		0.625	pCi/g	10/18/20 18:42	11/13/20 09:50		1

Lab Sample ID: LCS 160-486023/2-A
Matrix: Solid
Analysis Batch: 489004

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 486023

Analyte	Spike Added	LCS	LCS	Total	LOQ	DLC	Unit	%Rec	%Rec.	%Rec.	Limits
		Result	Qual	Uncert. (2σ+/-)							
Americium-241	96.4	92.49		9.77		0.671	pCi/g	96	96	96	87 - 116
Cesium-137	26.8	25.63		2.77	0.0700	0.131	pCi/g	96	96	96	87 - 120
Cobalt-60	9.57	9.188		1.00		0.0752	pCi/g	96	96	96	87 - 115

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
 SDG: G146599785

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: 160-39827-20 DU
Matrix: Solid
Analysis Batch: 489006

Client Sample ID: HPPG-ESU-TU153B-020
Prep Type: Total/NA
Prep Batch: 486023

Analyte	Sample	Sample	DU	DU	Total	LOQ	DLC	Unit	RER	RER	Limit
	Result	Qual	Result	Qual	Uncert. (2σ+/-)						
Actinium-227	0.0437	U	0.2406	U	0.470		0.277	pCi/g	0.36		1
Actinium 228	0.165		0.2970		0.262		0.127	pCi/g	0.27		1
Bismuth-212	-0.319	U	0.0000	U	0.119		0.208	pCi/g	0.29		1
Bismuth-214	0.278		0.4186		0.144		0.0506	pCi/g	0.54		1
Cesium-137	0.0276	U	-0.02086	U	0.0440	0.0700	0.0788	pCi/g	0.51		1
Lead-210	-0.931	U	-0.6903	U	2.13		1.77	pCi/g	0.06		1
Lead-212	0.376		0.3174		0.100		0.0407	pCi/g	0.31		1
Lead-214	0.396		0.3037		0.116		0.0662	pCi/g	0.38		1
Potassium-40	8.41		8.590		1.76		0.286	pCi/g	0.05		1
Protactinium-231	0.000	U	0.0000	U	0.778		2.37	pCi/g	0		1
Protactinium-234	0.0627	U	0.1094	U	0.293		0.252	pCi/g	0.1		1
Radium-226	0.278		0.4186		0.144	0.200	0.0506	pCi/g	0.54		1
Radium-228	0.165		0.2970		0.262		0.127	pCi/g	0.27		1
Thallium-208	0.139		0.1347		0.0920		0.0391	pCi/g	0.03		1
Thorium-232	0.165		0.2970		0.262		0.127	pCi/g	0.27		1
Thorium-234	-0.551	U	1.311		0.836		0.450	pCi/g	1.18		1
Thorium 228	0.376		0.3174		0.100		0.0407	pCi/g	0.31		1
Uranium-235	0.125	U	-0.01168	U	0.435		0.465	pCi/g	0.20		1
Uranium-238	-0.551	U	1.311		0.836		0.450	pCi/g	1.18		1

Lab Sample ID: MB 160-486025/1-A
Matrix: Solid
Analysis Batch: 489011

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 486025

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium-227	-0.1532	U	0.857	0.857		0.280	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Actinium 228	-0.1683	U	0.354	0.355		0.183	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Bismuth-212	0.0000	U	0.377	0.377		0.560	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Bismuth-214	-0.03130	U	0.0837	0.0838		0.176	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Cesium-137	-0.01454	U	0.0367	0.0368	0.0700	0.0502	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Lead-210	0.7008	U	1.62	1.62		1.09	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Lead-212	-0.02926	U	0.130	0.130		0.0758	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Lead-214	-0.04357	U	0.138	0.138		0.0937	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Potassium-40	-0.1967	U	1.08	1.08		0.304	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Protactinium-231	0.0000	U	0.447	0.447		2.23	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Protactinium-234	0.05300	U	0.167	0.167		0.134	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Radium-226	-0.03130	U	0.0837	0.0838	0.200	0.176	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Radium-228	-0.1683	U	0.354	0.355		0.183	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Thallium-208	0.009748	U	0.0116	0.0116		0.0430	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Thorium-232	-0.1683	U	0.354	0.355		0.183	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Thorium-234	0.7122		0.466	0.472		0.347	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Thorium 228	-0.02926	U	0.130	0.130		0.0758	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Uranium-235	0.01238	U	0.313	0.313		0.256	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Uranium-238	0.7122		0.466	0.472		0.347	pCi/g	10/18/20 19:20	11/13/20 18:28	1

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
 SDG: G146599785

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: LCS 160-486025/2-A
 Matrix: Solid
 Analysis Batch: 489012

Client Sample ID: Lab Control Sample
 Prep Type: Total/NA
 Prep Batch: 486025

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec. Limits	
Americium-241	96.4	99.03		10.4		0.571	pCi/g	103	87 - 116	
Cesium-137	26.8	27.08		2.89	0.0700	0.0962	pCi/g	101	87 - 120	
Cobalt-60	9.57	9.405		0.995		0.0413	pCi/g	98	87 - 115	



QC Association Summary

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
 SDG: G146599785

Rad

Leach Batch: 485315

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-39827-1	HPPG-ESU-TU153B-001	Total/NA	Solid	Dry and Grind	
160-39827-2	HPPG-ESU-TU153B-002	Total/NA	Solid	Dry and Grind	
160-39827-3	HPPG-ESU-TU153B-003	Total/NA	Solid	Dry and Grind	
160-39827-4	HPPG-ESU-TU153B-004	Total/NA	Solid	Dry and Grind	
160-39827-5	HPPG-ESU-TU153B-005	Total/NA	Solid	Dry and Grind	
160-39827-6	HPPG-ESU-TU153B-006	Total/NA	Solid	Dry and Grind	
160-39827-7	HPPG-ESU-TU153B-007	Total/NA	Solid	Dry and Grind	
160-39827-8	HPPG-ESU-TU153B-008	Total/NA	Solid	Dry and Grind	
160-39827-9	HPPG-ESU-TU153B-009	Total/NA	Solid	Dry and Grind	
160-39827-10	HPPG-ESU-TU153B-010	Total/NA	Solid	Dry and Grind	
160-39827-11	HPPG-ESU-TU153B-011	Total/NA	Solid	Dry and Grind	
160-39827-12	HPPG-ESU-TU153B-012	Total/NA	Solid	Dry and Grind	
160-39827-13	HPPG-ESU-TU153B-013	Total/NA	Solid	Dry and Grind	
160-39827-14	HPPG-ESU-TU153B-014	Total/NA	Solid	Dry and Grind	
160-39827-15	HPPG-ESU-TU153B-015	Total/NA	Solid	Dry and Grind	
160-39827-16	HPPG-ESU-TU153B-016	Total/NA	Solid	Dry and Grind	
160-39827-17	HPPG-ESU-TU153B-017	Total/NA	Solid	Dry and Grind	
160-39827-18	HPPG-ESU-TU153B-018	Total/NA	Solid	Dry and Grind	
160-39827-19	HPPG-ESU-TU153B-019	Total/NA	Solid	Dry and Grind	
160-39827-20	HPPG-ESU-TU153B-020	Total/NA	Solid	Dry and Grind	
160-39827-21	HPPG-ESU-TU153B-021	Total/NA	Solid	Dry and Grind	
160-39827-22	HPPG-ESU-TU153B-022	Total/NA	Solid	Dry and Grind	
160-39827-23	HPPG-ESU-TU153B-023	Total/NA	Solid	Dry and Grind	
160-39827-24	HPPG-ESU-TU153B-024	Total/NA	Solid	Dry and Grind	
160-39827-11 DU	HPPG-ESU-TU153B-011	Total/NA	Solid	Dry and Grind	
160-39827-20 DU	HPPG-ESU-TU153B-020	Total/NA	Solid	Dry and Grind	

Leach Batch: 485363

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-39827-25	HPPG-ESU-TU153B-025	Total/NA	Solid	Dry and Grind	
160-39827-26	HPPG-F-007	Total/NA	Solid	Dry and Grind	
160-39827-27	HPPG-F-008	Total/NA	Solid	Dry and Grind	

Prep Batch: 486023

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-39827-1	HPPG-ESU-TU153B-001	Total/NA	Solid	Fill_Geo-21	485315
160-39827-2	HPPG-ESU-TU153B-002	Total/NA	Solid	Fill_Geo-21	485315
160-39827-3	HPPG-ESU-TU153B-003	Total/NA	Solid	Fill_Geo-21	485315
160-39827-4	HPPG-ESU-TU153B-004	Total/NA	Solid	Fill_Geo-21	485315
160-39827-5	HPPG-ESU-TU153B-005	Total/NA	Solid	Fill_Geo-21	485315
160-39827-6	HPPG-ESU-TU153B-006	Total/NA	Solid	Fill_Geo-21	485315
160-39827-7	HPPG-ESU-TU153B-007	Total/NA	Solid	Fill_Geo-21	485315
160-39827-8	HPPG-ESU-TU153B-008	Total/NA	Solid	Fill_Geo-21	485315
160-39827-9	HPPG-ESU-TU153B-009	Total/NA	Solid	Fill_Geo-21	485315
160-39827-10	HPPG-ESU-TU153B-010	Total/NA	Solid	Fill_Geo-21	485315
160-39827-11	HPPG-ESU-TU153B-011	Total/NA	Solid	Fill_Geo-21	485315
160-39827-12	HPPG-ESU-TU153B-012	Total/NA	Solid	Fill_Geo-21	485315
160-39827-13	HPPG-ESU-TU153B-013	Total/NA	Solid	Fill_Geo-21	485315
160-39827-14	HPPG-ESU-TU153B-014	Total/NA	Solid	Fill_Geo-21	485315
160-39827-15	HPPG-ESU-TU153B-015	Total/NA	Solid	Fill_Geo-21	485315
160-39827-16	HPPG-ESU-TU153B-016	Total/NA	Solid	Fill_Geo-21	485315

QC Association Summary

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
 SDG: G146599785

Rad (Continued)

Prep Batch: 486023 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-39827-17	HPPG-ESU-TU153B-017	Total/NA	Solid	Fill_Geo-21	485315
160-39827-18	HPPG-ESU-TU153B-018	Total/NA	Solid	Fill_Geo-21	485315
160-39827-19	HPPG-ESU-TU153B-019	Total/NA	Solid	Fill_Geo-21	485315
160-39827-20	HPPG-ESU-TU153B-020	Total/NA	Solid	Fill_Geo-21	485315
MB 160-486023/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-486023/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-39827-20 DU	HPPG-ESU-TU153B-020	Total/NA	Solid	Fill_Geo-21	485315

Prep Batch: 486025

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-39827-21	HPPG-ESU-TU153B-021	Total/NA	Solid	Fill_Geo-21	485315
160-39827-22	HPPG-ESU-TU153B-022	Total/NA	Solid	Fill_Geo-21	485315
160-39827-23	HPPG-ESU-TU153B-023	Total/NA	Solid	Fill_Geo-21	485315
160-39827-24	HPPG-ESU-TU153B-024	Total/NA	Solid	Fill_Geo-21	485315
160-39827-25	HPPG-ESU-TU153B-025	Total/NA	Solid	Fill_Geo-21	485363
160-39827-26	HPPG-F-007	Total/NA	Solid	Fill_Geo-21	485363
160-39827-27	HPPG-F-008	Total/NA	Solid	Fill_Geo-21	485363
MB 160-486025/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-486025/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	

Prep Batch: 486247

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-39827-1	HPPG-ESU-TU153B-001	Total/NA	Solid	DPS-0	485315
MB 160-486247/24-A	Method Blank	Total/NA	Solid	DPS-0	
LCS 160-486247/1-A	Lab Control Sample	Total/NA	Solid	DPS-0	

Prep Batch: 486707

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-39827-11	HPPG-ESU-TU153B-011	Total/NA	Solid	DPS-0	485315
160-39827-21	HPPG-ESU-TU153B-021	Total/NA	Solid	DPS-0	485315
MB 160-486707/15-A	Method Blank	Total/NA	Solid	DPS-0	
LCS 160-486707/1-A	Lab Control Sample	Total/NA	Solid	DPS-0	
160-39827-11 DU	HPPG-ESU-TU153B-011	Total/NA	Solid	DPS-0	485315

Tracer/Carrier Summary

Page 90 of 139

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
SDG: G146599785

Method: 905.0 - Total Beta Strontium (GFPC)

Matrix: Solid

Prep Type: Total/NA

Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	Sr (40-110)
160-39827-1	HPPG-ESU-TU153B-001	90.9
160-39827-11	HPPG-ESU-TU153B-011	96.2
160-39827-11 DU	HPPG-ESU-TU153B-011	93.8
160-39827-21	HPPG-ESU-TU153B-021	92.1
LCS 160-486247/1-A	Lab Control Sample	96.5
LCS 160-486707/1-A	Lab Control Sample	91.7
MB 160-486247/24-A	Method Blank	94.2
MB 160-486707/15-A	Method Blank	96.1

Tracer/Carrier Legend

Sr = Sr Carrier



Environment Testing America

ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

Laboratory Job ID: 160-39827-2
Laboratory Sample Delivery Group: G146599785
Client Project/Site: HPNS-Parcel G 501197

For:
Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
Concord, California 94520

Attn: Rose Condit

Rhonda Ridenhower

Authorized for release by:
12/31/2020 1:15:58 PM

Rhonda Ridenhower, Client Service Manager
(314)298-8566
Rhonda.Ridenhower@Eurofinset.com



LINKS

Review your project
results through
TotalAccess

Have a Question?



Visit us at:
www.eurofinsus.com/Env

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12



Table of Contents

Cover Page	1
Table of Contents	2
Case Narrative	3
Chain of Custody	5
Receipt Checklists	9
Definitions/Glossary	10
Method Summary	11
Sample Summary	12
Client Sample Results	13
QC Sample Results	15
QC Association Summary	16
Tracer Carrier Summary	17

Case Narrative

Page 93 of 139

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-2
SDG: G146599785

Job ID: 160-39827-2

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: HPNS-Parcel G 501197

Report Number: 160-39827-2

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

RECEIPT

The samples were received on 10/09/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at

Case Narrative

Page 94 of 139

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-2
SDG: G146599785

Job ID: 160-39827-2 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

receipt was 18.9 C.

Additional analysis added by the client and not listed on the COC.

ISOTOPIC PLUTONIUM (ALPHA SPECTROMETRY)

Samples HPPG-ESU-TU153B-001 (160-39827-1), HPPG-ESU-TU153B-011 (160-39827-11) and HPPG-ESU-TU153B-021 (160-39827-21) were analyzed for Isotopic Plutonium (Alpha Spectrometry) in accordance with A-01-R. The samples were dried on 10/12/2020, prepared on 12/08/2020 and analyzed on 12/29/2020.

The method blank (MB) Z-score is within limits and is located in the level IV raw data. (MB 160-491191/1-A)

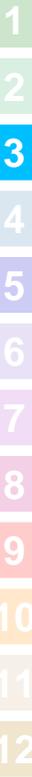
No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC URANIUM (ALPHA SPECTROMETRY)

Samples HPPG-ESU-TU153B-001 (160-39827-1), HPPG-ESU-TU153B-011 (160-39827-11) and HPPG-ESU-TU153B-021 (160-39827-21) were analyzed for Isotopic Uranium (Alpha Spectrometry) in accordance with DOE. The samples were dried on 10/12/2020, prepared on 12/08/2020 and analyzed on 12/29/2020.

The method blank (MB) Z-score is within limits and is located in the level IV raw data. (MB 160-491192/1-A)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.





CHAIN OF CUSTODY

Ref. Document # 501197RSY-007

APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy

Sample Lead: Lewis, Devin

Sample Tech(s): Joaquin Ramirez
Andrew Murri

Project Number: 501197
Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action
Project Location: San Francisco, CA
Purchase Order #: 1159058
Shipment/Pickup Date: 10/8/2020
Waybill Number: 4957 0225 2175
Lab Destination: Test America (St. Louis Lab)
13715 Rider Trail North
Earth City, MO 63046

Lab Contact Name/ph #: Rhoeda Ridenbower (314)298-8566

		Analysis Requested										Dose Rate uR/Hr	Evidence Bag ID	Comment
Matrix	# of Containers	Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Total Strontium (EPA 905 MOD)	Strontium-90 (EPA 905 MOD)										
		Preservatives (water)												
		Preservatives (soil)												
		Container Type												
		HPPG-ESU-TU153B-001	10/7/2020	10:34	G	SO	1	16 oz. plastic jar	X	X	X		4	GJ46599785
		HPPG-ESU-TU153B-002	10/7/2020	10:39	G	SO	1	16 oz. plastic jar	X				4	GJ46599785
		HPPG-ESU-TU153B-003	10/7/2020	10:47	G	SO	1	16 oz. plastic jar	X				4	GJ46599785
		HPPG-ESU-TU153B-004	10/7/2020	10:55	G	SO	1	16 oz. plastic jar	X				5	GJ46599785
		HPPG-ESU-TU153B-005	10/7/2020	11:02	G	SO	1	16 oz. plastic jar	X				4	GJ46599785
		HPPG-ESU-TU153B-006	10/7/2020	11:18	G	SO	1	16 oz. plastic jar	X				4	GJ46599785
		HPPG-ESU-TU153B-007	10/7/2020	12:31	G	SO	1	16 oz. plastic jar	X				4	GJ46599785
		HPPG-ESU-TU153B-008	10/7/2020	12:34	G	SO	1	16 oz. plastic jar	X				5	GJ46599785



Special Instructions: Analyze for Total Strontium as a screening step, and isotopic Sr-90 only if Total Strontium is above project action limit of 0.331 pCi/g

21 day ingrowth results only

Turanaround Time: 3-day 10-Day 28-day Other

Level of QC Required: I II III Project Specific

Method Codes C = Composite G = Grab **Matrix Codes:** DW = Drinking Water ; So = Soil; GW = Ground Water; SL = Sludge; WW = Waste Water; CP = Chip Samples; A = Air ; ABS = Asbestos; PO = Pipe Opening

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		10/07/2020 16:09	Locked Stored (RKillpack)		10/07/2020 16:09
Locked Stored (RKillpack)		10/08/2020 10:21	Devin Lewis		10/08/2020 10:21
Devin Lewis		10/08/2020 10:32	SHIPPEDTOLAB		10/08/2020 10:32

*** Last 3 transfers shown above - Complete list of transfers on last page ***





CHAIN OF CUSTODY

Ref. Document # 501197RSY-007

APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy
City: Concord, CA 94520

Sample Lead: Lewis, Devin

Sample Tech(s): Joaquin Ramirez
Andrew Murri

Project Number: 501197

Hunters Point Naval Shipyard: Parcel
G Remedial Action

Project Name:

Project Location: San Francisco, CA

Purchase Order #: 1159058

Shipment/Pickup Date: 10/8/2020

Waybill Number: 4957 0225 2175

Lab Destination: Test America (St. Louis Lab)
13715 Rider Trail North
Earth City, MO 63046

Lab Contact Name/ph # Rhoeda Ridenbower (314)298-8566

Sample ID	Collection Information			Matrix	# of Containers	Analysis Requested							Dose Rate uR/Hr	Evidence Bag ID	Comment		
	Date	Time	Method			Preservatives (water)	Preservatives (soil)	Container Type	Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Total Strontium (EPA 905 MOD)	Strontium-90 (EPA 905 MOD)						
HPPG-ESU-TU153B-009	10/7/2020	12:39	G	SO	1	16 oz. plastic jar	X							4	GJ46599785		
HPPG-ESU-TU153B-010	10/7/2020	12:46	G	SO	1	16 oz. plastic jar	X							4	GJ46599785		
HPPG-ESU-TU153B-011	10/7/2020	12:52	G	SO	1	16 oz. plastic jar	X	X	X					4	GJ46599785		
HPPG-ESU-TU153B-012	10/7/2020	12:58	G	SO	1	16 oz. plastic jar	X							5	GJ46599785		
HPPG-ESU-TU153B-013	10/7/2020	13:05	G	SO	1	16 oz. plastic jar	X							5	GJ46599785		
HPPG-ESU-TU153B-014	10/7/2020	13:13	G	SO	1	16 oz. plastic jar	X							4	GJ46599785		
HPPG-ESU-TU153B-015	10/7/2020	13:18	G	SO	1	16 oz. plastic jar	X							5	GJ46599785		
HPPG-ESU-TU153B-016	10/7/2020	13:20	G	SO	1	16 oz. plastic jar	X							4	GJ46599785		
HPPG-ESU-TU153B-017	10/7/2020	13:22	G	SO	1	16 oz. plastic jar	X							4	GJ46599785		
HPPG-ESU-TU153B-018	10/7/2020	13:29	G	SO	1	16 oz. plastic jar	X							5	GJ46599785		
HPPG-ESU-TU153B-019	10/7/2020	13:31	G	SO	1	16 oz. plastic jar	X							4	GJ46599785		
HPPG-ESU-TU153B-020	10/7/2020	13:33	G	SO	1	16 oz. plastic jar	X							4	GJ46599785		
HPPG-ESU-TU153B-021	10/7/2020	13:35	G	SO	1	16 oz. plastic jar	X	X	X					4	GJ46599785		
HPPG-ESU-TU153B-022	10/7/2020	13:38	G	SO	1	16 oz. plastic jar	X							4	GJ46599785		
HPPG-ESU-TU153B-023	10/7/2020	13:41	G	SO	1	16 oz. plastic jar	X							4	GJ46599785		
HPPG-ESU-TU153B-024	10/7/2020	13:44	G	SO	1	16 oz. plastic jar	X							5	GJ46599785		
HPPG-ESU-TU153B-025	10/7/2020	13:49	G	SO	1	16 oz. plastic jar	X							4	GJ46599785		





CHAIN OF CUSTODY

Ref. Document # 501197RSY-007

APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy
City: Concord, CA 94520

Sample Lead: Lewis, Devin

Sample Tech(s): Joaquin Ramirez
Andrew Murri

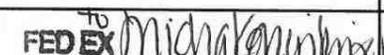
Project Number: 501197
Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action
Project Location: San Francisco, CA
Purchase Order #: 1159058
Shipment/Pickup Date: 10/8/2020
Waybill Number: 4957 0225 2175
Lab Destination: Test America (St. Louis Lab)
13715 Rider Trail North
Earth City, MO 63046

Lab Contact Name/ph #: Rhoeda Ridenbower (314)298-8566

Sample ID	Collection Information			Matrix	# of Containers	Container Type	Analysis Requested						Dose Rate uR/Hr	Evidence Bag ID	Comment	
	Date	Time	Method				Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Total Strontium (EPA 905 MOD)	Strontium-90 (EPA 905 MOD)							
HPPG-F-007	10/7/2020	10:55	G	SO	1	16 oz. plastic jar	X							4	GJ46599785	
HPPG-F-008	10/7/2020	13:13	G	SO	1	16 oz. plastic jar	X							4	GJ46599785	



All Transfers for COC 501197RSY-007

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		10/07/2020 16:09	Locked Stored (RKillpack)		10/07/2020 16:09
Locked Stored (RKillpack)		10/08/2020 10:21	Devin Lewis		10/08/2020 10:21
Devin Lewis		10/08/2020 10:32	SHIPPEDTOLAB	FED EX  <i>To Michalek</i>	10/09/2020 08:55



Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-39827-2
SDG Number: G146599785**Login Number: 39827****List Source: Eurofins TestAmerica, St. Louis****List Number: 1****Creator: Ridenhower, Rhonda E**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-2
SDG: G146599785

Qualifiers

Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Method Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-2
SDG: G146599785

Method	Method Description	Protocol	Laboratory
A-01-R	Isotopic Plutonium and Neptunium (Alpha Spectrometry)	DOE	TAL SL
A-01-R	Isotopic Uranium (Alpha Spectrometry)	DOE	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
ExtChrom	Preparation, Extraction Chromatography Resin Actinide Separation	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy
None = None

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566



Sample Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-2
SDG: G146599785

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-39827-1	HPPG-ESU-TU153B-001	Solid	10/07/20 10:34	10/09/20 08:55	
160-39827-11	HPPG-ESU-TU153B-011	Solid	10/07/20 12:52	10/09/20 08:55	
160-39827-21	HPPG-ESU-TU153B-021	Solid	10/07/20 13:35	10/09/20 08:55	

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-2
 SDG: G146599785

Client Sample ID: HPPG-ESU-TU153B-001

Lab Sample ID: 160-39827-1

Date Collected: 10/07/20 10:34

Matrix: Solid

Date Received: 10/09/20 08:55

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-239/240	0.00203	U	0.00406	0.00407	0.100	0.00473	pCi/g	12/08/20 18:08	12/29/20 09:30	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Pu-242 (T)	82.6		30 - 110					12/08/20 18:08	12/29/20 09:30	1

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Uranium-235/236	0.0236		0.0163	0.0165	0.100	0.00549	pCi/g	12/08/20 18:27	12/29/20 15:24	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	89.2		30 - 110					12/08/20 18:27	12/29/20 15:24	1

Client Sample ID: HPPG-ESU-TU153B-011

Lab Sample ID: 160-39827-11

Date Collected: 10/07/20 12:52

Matrix: Solid

Date Received: 10/09/20 08:55

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-239/240	0.00197	U	0.00394	0.00395	0.100	0.00459	pCi/g	12/08/20 18:08	12/29/20 09:30	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Pu-242 (T)	85.3		30 - 110					12/08/20 18:08	12/29/20 09:30	1

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Uranium-235/236	0.00992	U	0.0157	0.0157	0.100	0.00999	pCi/g	12/08/20 18:27	12/29/20 15:24	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	87.6		30 - 110					12/08/20 18:27	12/29/20 15:24	1

Client Sample ID: HPPG-ESU-TU153B-021

Lab Sample ID: 160-39827-21

Date Collected: 10/07/20 13:35

Matrix: Solid

Date Received: 10/09/20 08:55

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-239/240	-0.00396	U	0.00561	0.00562	0.100	0.00652	pCi/g	12/08/20 18:08	12/29/20 09:30	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Pu-242 (T)	87.4		30 - 110					12/08/20 18:08	12/29/20 09:30	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-2
 SDG: G146599785

Client Sample ID: HPPG-ESU-TU153B-021

Lab Sample ID: 160-39827-21

Date Collected: 10/07/20 13:35

Matrix: Solid

Date Received: 10/09/20 08:55

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Uranium-235/236	0.0171		0.0162	0.0163	0.100	0.00803	pCi/g	12/08/20 18:27	12/29/20 15:25	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	99.9		30 - 110					12/08/20 18:27	12/29/20 15:25	1

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-2
 SDG: G146599785

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Lab Sample ID: MB 160-491192/1-A
Matrix: Solid
Analysis Batch: 493438

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 491192

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Uranium-235/236	0.002324	U	0.0154	0.0154	0.100	0.0121	pCi/g	12/08/20 18:27	12/29/20 15:25	1
Tracer	MB %Yield	MB Qualifier	Limits		Prepared	Analyzed	Dil Fac			
Uranium-232	110		30 - 110		12/08/20 18:27	12/29/20 15:25	1			

Lab Sample ID: LCS 160-491192/2-A
Matrix: Solid
Analysis Batch: 493439

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 491192

Analyte	Spike Added	LCS	LCS	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits
		Result	Qual	Uncert. (2σ+/-)					
Uranium-234	3.18	2.973		0.294	0.100	0.0114	pCi/g	93	84 - 120
Uranium-238	3.26	3.045		0.299	0.100	0.00463	pCi/g	94	82 - 122
Tracer	LCS %Yield	LCS Qualifier	Limits		Prepared	Analyzed	Dil Fac		
Uranium-232	99.3		30 - 110						

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Lab Sample ID: MB 160-491191/1-A
Matrix: Solid
Analysis Batch: 493386

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 491191

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Plutonium-239/240	0.003831	U	0.00938	0.00939	0.100	0.00630	pCi/g	12/08/20 18:08	12/29/20 09:30	1
Tracer	MB %Yield	MB Qualifier	Limits		Prepared	Analyzed	Dil Fac			
Pu-242 (T)	93.0		30 - 110		12/08/20 18:08	12/29/20 09:30	1			

Lab Sample ID: LCS 160-491191/2-A
Matrix: Solid
Analysis Batch: 493387

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 491191

Analyte	Spike Added	LCS	LCS	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits
		Result	Qual	Uncert. (2σ+/-)					
Plutonium-239/240	2.64	2.491		0.250	0.100	0.00439	pCi/g	94	81 - 125
Tracer	LCS %Yield	LCS Qualifier	Limits		Prepared	Analyzed	Dil Fac		
Pu-242 (T)	97.0		30 - 110						

QC Association Summary

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-2
 SDG: G146599785

Rad

Leach Batch: 490789

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-39827-1	HPPG-ESU-TU153B-001	Total/NA	Solid	Dry and Grind	
160-39827-11	HPPG-ESU-TU153B-011	Total/NA	Solid	Dry and Grind	
160-39827-21	HPPG-ESU-TU153B-021	Total/NA	Solid	Dry and Grind	

Prep Batch: 491191

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-39827-1	HPPG-ESU-TU153B-001	Total/NA	Solid	ExtChrom	490789
160-39827-11	HPPG-ESU-TU153B-011	Total/NA	Solid	ExtChrom	490789
160-39827-21	HPPG-ESU-TU153B-021	Total/NA	Solid	ExtChrom	490789
MB 160-491191/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-491191/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	

Prep Batch: 491192

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-39827-1	HPPG-ESU-TU153B-001	Total/NA	Solid	ExtChrom	490789
160-39827-11	HPPG-ESU-TU153B-011	Total/NA	Solid	ExtChrom	490789
160-39827-21	HPPG-ESU-TU153B-021	Total/NA	Solid	ExtChrom	490789
MB 160-491192/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-491192/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	

Tracer/Carrier Summary

Page 107 of 139

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-2
SDG: G146599785

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Matrix: Solid

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)	
Lab Sample ID	Client Sample ID	Pu-242 (T)	(30-110)
160-39827-1	HPPG-ESU-TU153B-001	82.6	
160-39827-11	HPPG-ESU-TU153B-011	85.3	
160-39827-21	HPPG-ESU-TU153B-021	87.4	
LCS 160-491191/2-A	Lab Control Sample	97.0	
MB 160-491191/1-A	Method Blank	93.0	

Tracer/Carrier Legend
Pu-242 (T) = Pu-242 (T)

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Matrix: Solid

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)	
Lab Sample ID	Client Sample ID	U-232	(30-110)
160-39827-1	HPPG-ESU-TU153B-001	89.2	
160-39827-11	HPPG-ESU-TU153B-011	87.6	
160-39827-21	HPPG-ESU-TU153B-021	99.9	
LCS 160-491192/2-A	Lab Control Sample	99.3	
MB 160-491192/1-A	Method Blank	110	

Tracer/Carrier Legend
U-232 = Uranium-232



Environment Testing America

ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

Laboratory Job ID: 160-39828-1
Laboratory Sample Delivery Group: D1189476
Client Project/Site: HPNS-Parcel G 501197
Revision: 1

For:
Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
Concord, California 94520

Attn: Rose Condit

Rhonda Ridenhower

Authorized for release by:
4/19/2021 9:46:07 AM

Rhonda Ridenhower, Client Service Manager
(314)298-8566
Rhonda.Ridenhower@Eurofinset.com

LINKS

Review your project
results through
TotalAccess

Have a Question?



Visit us at:

www.eurofinsus.com/Env

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

1

2

3

4

5

6

7

8

9

10

11

12



Table of Contents

Cover Page	1
Table of Contents	2
Case Narrative	3
Chain of Custody	6
Receipt Checklists	8
Definitions/Glossary	9
Method Summary	10
Sample Summary	11
Client Sample Results	12
QC Sample Results	13
QC Association Summary	15
Tracer Carrier Summary	16

Case Narrative

Page 110 of 139

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39828-1
SDG: D1189476

Job ID: 160-39828-1

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: HPNS-Parcel G 501197

Report Number: 160-39828-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

Revision 1- Additional information requested in case narrative for strontium

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39828-1
 SDG: D1189476

Job ID: 160-39828-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

RECEIPT

The samples were received on 10/09/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 18.9 C.

TOTAL BETA STRONTIUM (GFPC)

Sample HPPG-ESU-TU153B-B-001 (160-39828-1) was analyzed for Total Beta Strontium (GFPC) in accordance with EPA 905. The samples were leached on 10/13/2020, prepared on 10/27/2020 and analyzed on 11/12/2020.

When taking small mass aliquots from dried/disaggregated sample, the laboratory avoids large rocks/pebbles (as well as sticks, etc) which may constitute a larger than representative portion of the aliquot. Smaller rocks may be included. This is consistent with QSM and Laboratory SOP: HPPG-ESU-TU153B-B-001 (160-39828-1) and (160-39828-A-1-A DU).

The method blank (MB) Z-score is within limits and is located in the level IV raw data.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Sample HPPG-ESU-TU153B-B-001 (160-39828-1) was analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA_01_R. The samples were leached on 10/13/2020, prepared on 10/18/2020 and analyzed on 11/13/2020.

Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

Inferred from	Reported to Analyte
Th-234	Pa-234
Th-234	U-238
Pb-210	Po-210
Pb-210	Bi-210
Cs-137	Ba-137m
Pb-212	Po-216
Xe-131m	Xe-131
Sb-125	Te-125m
Ag-108m	Ag-108
Rh-106	Ru-106
Pb-212	Th-228
Pb-212	Ra-224
U-235	Th-231
Ac-228	Th-232
Ac-228	Ra-228
Th-227	Ra-223
Th-227	Ac-227
Th-227	Bi-211
Th-227	Pb-211
Bi-214	Ra-226

The cesium-137 detection goal of 0.0700 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline. HPPG-ESU-TU153B-B-001 (160-39828-1)

The MB z-score for Th-234/U-238 associated with Prep Batch 160-486025 does not meet QC criteria. This appears to be random in nature, and limited deviations such as this are statistically expected when larger analyte lists are reported. Such excursions are often caused by fluctuations in Compton background, force-fitting of peaks that are not found by the software peak-search algorithm, and inclusion of inferior peak results by the software in weighted averages. The laboratory SOP allows for such statistical exceedances. (MB 160-486025/1-A)

Case Narrative

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39828-1
SDG: D1189476

Job ID: 160-39828-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

1

2

3

4

5

6

7

8

9

10

11

12



CHAIN OF CUSTODY

Ref. Document # 501197RSY-008

APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy

Sample Lead: Lewis, Devin

Sample Tech(s):

Project Number: 501197
Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action
Project Location: San Francisco, CA
Purchase Order #: 1159058
Shipment/Pickup Date: 10/8/2020
Waybill Number: 4957 0225 2175
Lab Destination: Test America (St. Louis Lab)
13715 Rider Trail North
Earth City, MO 63046

Lab Contact Name/ph # Rhoeda Ridenbower (314)298-8566

Analysis Requested



160-39828 Chain of Custody

Sample ID	Collection Information			Matrix	# of Containers	Container Type	Analysis Requested				Dose Rate uR/Hr	Evidence Bag ID	Comment	
	Date	Time	Method				Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Total Strontium (EPA 905 MOD)	Strontium-90 (EPA 905 MOD)					
HPPG-ESU-TU153B-B-001	10/8/2020	09:40	G	SO	1	16 oz. plastic jar	X	X	X			4	D1189476	

Special Instructions: 21 day ingrowth results only
Analyze for Total Strontium as a screening step, and isotopic Sr-90 only if Total Strontium is above project action limit of 0.331 pCi/g

Turanaround Time: 3-day 10-Day 28-day Other **Level of QC Required:** I II III Project Specific

Method Codes C = Composite G = Grab **Matrix Codes:** DW = Drinking Water; So = Soil; GW = Ground Water; SL = Sludge; WW = Waste Water; CP = Chip Samples; A = Air; ABS = Asbestos; PO = Pipe Opening

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		10/08/2020 11:10	SHIPPED TO LAB FED EX		09:55 OCT 09 2020

*** Last 3 transfers shown above - Complete list of transfers on last page ***

Page 6 of 16

4/19/2021 (Rev. 1)



All Transfers for COC 501197RSY-008

Page 2 of 2

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		10/08/2020 11:10	SHIPPEDTOLAB		



Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-39828-1

SDG Number: D1189476

Login Number: 39828**List Source: Eurofins TestAmerica, St. Louis****List Number: 1****Creator: Ridenhower, Rhonda E**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39828-1
SDG: D1189476

Qualifiers

Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Method Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39828-1
SDG: D1189476

Method	Method Description	Protocol	Laboratory
905.0	Total Beta Strontium (GFPC)	DOE	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-0	Preparation, Digestion/ Precipitate	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy
None = None

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566



Sample Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39828-1
SDG: D1189476

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-39828-1	HPPG-ESU-TU153B-B-001	Solid	10/08/20 09:40	10/09/20 08:55	

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39828-1
 SDG: D1189476

Client Sample ID: HPPG-ESU-TU153B-B-001

Lab Sample ID: 160-39828-1

Date Collected: 10/08/20 09:40

Matrix: Solid

Date Received: 10/09/20 08:55

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.0677		0.0640	0.0641	0.160	0.0474	pCi/g	10/27/20 08:55	11/12/20 12:46	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	96.7		40 - 110					10/27/20 08:55	11/12/20 12:46	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-227	-0.406	U	0.774	0.775		0.466	pCi/g	10/18/20 19:20	11/13/20 18:33	1
Actinium 228	0.386		0.307	0.310		0.149	pCi/g	10/18/20 19:20	11/13/20 18:33	1
Bismuth-212	0.440	U	0.791	0.792		0.605	pCi/g	10/18/20 19:20	11/13/20 18:33	1
Bismuth-214	0.404		0.122	0.131		0.0473	pCi/g	10/18/20 19:20	11/13/20 18:33	1
Cesium-137	-0.0534	U	0.0451	0.0455	0.0700	0.0757	pCi/g	10/18/20 19:20	11/13/20 18:33	1
Lead-210	1.04		1.30	1.31		0.920	pCi/g	10/18/20 19:20	11/13/20 18:33	1
Lead-212	0.350		0.105	0.113		0.0632	pCi/g	10/18/20 19:20	11/13/20 18:33	1
Lead-214	0.543		0.145	0.158		0.0638	pCi/g	10/18/20 19:20	11/13/20 18:33	1
Potassium-40	8.85		1.73	2.01		0.463	pCi/g	10/18/20 19:20	11/13/20 18:33	1
Protactinium-231	-0.366	U	3.18	3.18		2.60	pCi/g	10/18/20 19:20	11/13/20 18:33	1
Protactinium-234	-0.0870	U	0.346	0.346		0.283	pCi/g	10/18/20 19:20	11/13/20 18:33	1
Radium-226	0.404		0.122	0.131	0.200	0.0473	pCi/g	10/18/20 19:20	11/13/20 18:33	1
Radium-228	0.386		0.307	0.310		0.149	pCi/g	10/18/20 19:20	11/13/20 18:33	1
Thallium-208	0.200		0.0679	0.0718		0.0238	pCi/g	10/18/20 19:20	11/13/20 18:33	1
Thorium-232	0.386		0.307	0.310		0.149	pCi/g	10/18/20 19:20	11/13/20 18:33	1
Thorium-234	-0.535	U	0.648	0.651		0.945	pCi/g	10/18/20 19:20	11/13/20 18:33	1
Thorium 228	0.350		0.105	0.113		0.0632	pCi/g	10/18/20 19:20	11/13/20 18:33	1
Uranium-235	0.00585	U	0.457	0.457		0.376	pCi/g	10/18/20 19:20	11/13/20 18:33	1
Uranium-238	-0.535	U	0.648	0.651		0.945	pCi/g	10/18/20 19:20	11/13/20 18:33	1

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39828-1
 SDG: D1189476

Method: 905.0 - Total Beta Strontium (GFPC)

Lab Sample ID: MB 160-486883/9-A
Matrix: Solid
Analysis Batch: 488987

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 486883

Analyte	MB MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Total Beta Strontium	0.07370		0.0654	0.0656	0.160	0.0481	pCi/g	10/27/20 08:55	11/12/20 18:59	1
Carrier	MB MB		Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	%Yield	Qualifier	40 - 110					10/27/20 08:55	11/12/20 18:59	1

Lab Sample ID: LCS 160-486883/1-A
Matrix: Solid
Analysis Batch: 488987

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 486883

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits
				Uncert. (2σ+/-)					
Total Beta Strontium	7.78	6.631		0.547	0.160	0.0465	pCi/g	85	75 - 125
Carrier	LCS %Yield	LCS Qualifier	Limits						
Sr Carrier	89.9		40 - 110						

Lab Sample ID: 160-39828-1 DU
Matrix: Solid
Analysis Batch: 488987

Client Sample ID: HPPG-ESU-TU153B-B-001
Prep Type: Total/NA
Prep Batch: 486883

Analyte	Sample Sample		DU DU		Total	LOQ	DLC	Unit	RER	RER Limit
	Result	Qual	Result	Qual	Uncert. (2σ+/-)					
Total Beta Strontium	0.0677		0.04157	U	0.0607	0.160	0.0461	pCi/g	0.21	1
Carrier	DU %Yield	DU Qualifier	Limits							
Sr Carrier	84.9		40 - 110							

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-486025/1-A
Matrix: Solid
Analysis Batch: 489011

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 486025

Analyte	MB MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium-227	-0.1532	U	0.857	0.857		0.280	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Actinium 228	-0.1683	U	0.354	0.355		0.183	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Bismuth-212	0.0000	U	0.377	0.377		0.560	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Bismuth-214	-0.03130	U	0.0837	0.0838		0.176	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Cesium-137	-0.01454	U	0.0367	0.0368	0.0700	0.0502	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Lead-210	0.7008	U	1.62	1.62		1.09	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Lead-212	-0.02926	U	0.130	0.130		0.0758	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Lead-214	-0.04357	U	0.138	0.138		0.0937	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Potassium-40	-0.1967	U	1.08	1.08		0.304	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Protactinium-231	0.0000	U	0.447	0.447		2.23	pCi/g	10/18/20 19:20	11/13/20 18:28	1

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39828-1
 SDG: D1189476

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: MB 160-486025/1-A
Matrix: Solid
Analysis Batch: 489011

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 486025

Analyte	MB MB		Count	Total	LOQ	DLC	Unit	Prepared		Analyzed		Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)				10/18/20 19:20	11/13/20 18:28			
Protactinium-234	0.05300	U	0.167	0.167		0.134	pCi/g	10/18/20 19:20	11/13/20 18:28		1	
Radium-226	-0.03130	U	0.0837	0.0838	0.200	0.176	pCi/g	10/18/20 19:20	11/13/20 18:28		1	
Radium-228	-0.1683	U	0.354	0.355		0.183	pCi/g	10/18/20 19:20	11/13/20 18:28		1	
Thallium-208	0.009748	U	0.0116	0.0116		0.0430	pCi/g	10/18/20 19:20	11/13/20 18:28		1	
Thorium-232	-0.1683	U	0.354	0.355		0.183	pCi/g	10/18/20 19:20	11/13/20 18:28		1	
Thorium-234	0.7122		0.466	0.472		0.347	pCi/g	10/18/20 19:20	11/13/20 18:28		1	
Thorium 228	-0.02926	U	0.130	0.130		0.0758	pCi/g	10/18/20 19:20	11/13/20 18:28		1	
Uranium-235	0.01238	U	0.313	0.313		0.256	pCi/g	10/18/20 19:20	11/13/20 18:28		1	
Uranium-238	0.7122		0.466	0.472		0.347	pCi/g	10/18/20 19:20	11/13/20 18:28		1	

Lab Sample ID: LCS 160-486025/2-A
Matrix: Solid
Analysis Batch: 489012

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 486025

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec Limits
				Uncert. (2σ+/-)					
Americium-241	96.4	99.03		10.4		0.571	pCi/g	103	87 - 116
Cesium-137	26.8	27.08		2.89	0.0700	0.0962	pCi/g	101	87 - 120
Cobalt-60	9.57	9.405		0.995		0.0413	pCi/g	98	87 - 115

Lab Sample ID: 160-39828-1 DU
Matrix: Solid
Analysis Batch: 489009

Client Sample ID: HPPG-ESU-TU153B-B-001
Prep Type: Total/NA
Prep Batch: 486025

Analyte	Sample Sample		DU DU	Total	LOQ	DLC	Unit	RER	RER
	Result	Qual	Result	Qual					Uncert. (2σ+/-)
Actinium-227	-0.406	U	0.4101		0.406	0.224	pCi/g	0.69	1
Actinium 228	0.386		0.3376		0.223	0.0937	pCi/g	0.09	1
Bismuth-212	0.440	U	-0.02076	U	0.740	0.608	pCi/g	0.30	1
Bismuth-214	0.404		0.4547		0.126	0.0440	pCi/g	0.20	1
Cesium-137	-0.0534	U	0.02061	U	0.0572	0.0450	pCi/g	0.72	1
Lead-210	1.04		1.670		1.98	1.17	pCi/g	0.19	1
Lead-212	0.350		0.4370		0.102	0.0437	pCi/g	0.41	1
Lead-214	0.543		0.5199		0.129	0.0587	pCi/g	0.08	1
Potassium-40	8.85		9.126		1.63	0.115	pCi/g	0.08	1
Protactinium-231	-0.366	U	0.0000	U	0.276	2.23	pCi/g	0.11	1
Protactinium-234	-0.0870	U	0.04812	U	0.0325	0.251	pCi/g	0.36	1
Radium-226	0.404		0.4547		0.126	0.0440	pCi/g	0.20	1
Radium-228	0.386		0.3376		0.223	0.0937	pCi/g	0.09	1
Thallium-208	0.200		0.2126		0.0619	0.0141	pCi/g	0.09	1
Thorium-232	0.386		0.3376		0.223	0.0937	pCi/g	0.09	1
Thorium-234	-0.535	U	0.4940		0.660	0.464	pCi/g	0.78	1
Thorium 228	0.350		0.4370		0.102	0.0437	pCi/g	0.41	1
Uranium-235	0.00585	U	-0.03244	U	0.0582	0.514	pCi/g	0.07	1
Uranium-238	-0.535	U	0.4940		0.660	0.464	pCi/g	0.78	1

QC Association Summary

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39828-1
 SDG: D1189476

Rad

Leach Batch: 485363

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-39828-1	HPPG-ESU-TU153B-B-001	Total/NA	Solid	Dry and Grind	
160-39828-1 DU	HPPG-ESU-TU153B-B-001	Total/NA	Solid	Dry and Grind	

Prep Batch: 486025

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-39828-1	HPPG-ESU-TU153B-B-001	Total/NA	Solid	Fill_Geo-21	485363
MB 160-486025/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-486025/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-39828-1 DU	HPPG-ESU-TU153B-B-001	Total/NA	Solid	Fill_Geo-21	485363

Prep Batch: 486883

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-39828-1	HPPG-ESU-TU153B-B-001	Total/NA	Solid	DPS-0	485363
MB 160-486883/9-A	Method Blank	Total/NA	Solid	DPS-0	
LCS 160-486883/1-A	Lab Control Sample	Total/NA	Solid	DPS-0	
160-39828-1 DU	HPPG-ESU-TU153B-B-001	Total/NA	Solid	DPS-0	485363

Tracer/Carrier Summary

Page 123 of 139

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39828-1
SDG: D1189476

Method: 905.0 - Total Beta Strontium (GFPC)

Matrix: Solid

Prep Type: Total/NA

Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	Sr (40-110)
160-39828-1	HPPG-ESU-TU153B-B-001	96.7
160-39828-1 DU	HPPG-ESU-TU153B-B-001	84.9
LCS 160-486883/1-A	Lab Control Sample	89.9
MB 160-486883/9-A	Method Blank	93.8

Tracer/Carrier Legend

Sr = Sr Carrier



Environment Testing America

ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

Laboratory Job ID: 160-39828-2
Laboratory Sample Delivery Group: D1189476
Client Project/Site: HPNS-Parcel G 501197

For:
Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
Concord, California 94520

Attn: Rose Condit

Rhonda Ridenhower

Authorized for release by:
1/5/2021 11:04:00 PM

Rhonda Ridenhower, Client Service Manager
(314)298-8566
Rhonda.Ridenhower@Eurofinset.com

LINKS

Review your project
results through
TotalAccess

Have a Question?



Visit us at:

www.eurofinsus.com/Env

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

1

2

3

4

5

6

7

8

9

10

11

12



Table of Contents

Cover Page	1
Table of Contents	2
Case Narrative	3
Chain of Custody	5
Receipt Checklists	7
Definitions/Glossary	8
Method Summary	9
Sample Summary	10
Client Sample Results	11
QC Sample Results	12
QC Association Summary	13
Tracer Carrier Summary	14

Case Narrative

Page 126 of 139

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39828-2
SDG: D1189476

Job ID: 160-39828-2

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: HPNS-Parcel G 501197

Report Number: 160-39828-2

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

RECEIPT

The samples were received on 10/09/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at

Case Narrative

Page 127 of 139

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39828-2
SDG: D1189476

Job ID: 160-39828-2 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

receipt was 18.9 C.

Additional analysis requested and not listed on the COC.

ISOTOPIC PLUTONIUM (ALPHA SPECTROMETRY)

Sample HPPG-ESU-TU153B-B-001 (160-39828-1) was analyzed for Isotopic Plutonium (Alpha Spectrometry) in accordance with A-01-R. The samples were dried on 10/13/2020, prepared on 12/08/2020 and analyzed on 12/29/2020.

The method blank (MB) Z-score is within limits and is located in the level IV raw data. (MB 160-491191/1-A)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC URANIUM (ALPHA SPECTROMETRY)

Sample HPPG-ESU-TU153B-B-001 (160-39828-1) was analyzed for Isotopic Uranium (Alpha Spectrometry) in accordance with DOE. The samples were dried on 10/13/2020, prepared on 12/08/2020 and analyzed on 12/29/2020.

The method blank (MB) Z-score is within limits and is located in the level IV raw data. (MB 160-491192/1-A)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



CHAIN OF CUSTODY

Ref. Document # 501197RSY-008

APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy

Sample Lead: Lewis, Devin

Sample Tech(s):

Project Number: 501197
Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action
Project Location: San Francisco, CA
Purchase Order #: 1159058
Shipment/Pickup Date: 10/8/2020
Waybill Number: 4957 0225 2175
Lab Destination: Test America (St. Louis Lab)
13715 Rider Trail North
Earth City, MO 63046

Lab Contact Name/ph # Rhoeda Ridenbower (314)298-8566

Analysis Requested



160-39828 Chain of Custody

Sample ID	Collection Information			Matrix	# of Containers	Container Type	Analysis Requested				Dose Rate uR/Hr	Evidence Bag ID	Comment	
	Date	Time	Method				Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Total Strontium (EPA 905 MOD)	Strontium-90 (EPA 905 MOD)					
HPPG-ESU-TU153B-B-001	10/8/2020	09:40	G	SO	1	16 oz. plastic jar	X	X	X			4	D1189476	

Special Instructions: 21 day ingrowth results only
Analyze for Total Strontium as a screening step, and isotopic Sr-90 only if Total Strontium is above project action limit of 0.331 pCi/g

Turanaround Time: 3-day 10-Day 28-day Other **Level of QC Required:** I II III Project Specific

Method Codes C = Composite G = Grab **Matrix Codes:** DW = Drinking Water; So = Soil; GW = Ground Water; SL = Sludge; WW = Waste Water; CP = Chip Samples; A = Air; ABS = Asbestos; PO = Pipe Opening

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		10/08/2020 11:10	SHIPPED TO LAB FED EX		09:55 OCT 09 2020

*** Last 3 transfers shown above - Complete list of transfers on last page ***



All Transfers for COC 501197RSY-008

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		10/08/2020 11:10	SHIPPEDTOLAB		



Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-39828-2

SDG Number: D1189476

Login Number: 39828**List Source: Eurofins TestAmerica, St. Louis****List Number: 1****Creator: Ridenhower, Rhonda E**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39828-2
SDG: D1189476

Qualifiers

Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Method Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39828-2
SDG: D1189476

Method	Method Description	Protocol	Laboratory
A-01-R	Isotopic Plutonium and Neptunium (Alpha Spectrometry)	DOE	TAL SL
A-01-R	Isotopic Uranium (Alpha Spectrometry)	DOE	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
ExtChrom	Preparation, Extraction Chromatography Resin Actinide Separation	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy
None = None

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566



Sample Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39828-2
SDG: D1189476

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-39828-1	HPPG-ESU-TU153B-B-001	Solid	10/08/20 09:40	10/09/20 08:55	

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39828-2
 SDG: D1189476

Client Sample ID: HPPG-ESU-TU153B-B-001

Lab Sample ID: 160-39828-1

Date Collected: 10/08/20 09:40

Matrix: Solid

Date Received: 10/09/20 08:55

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-239/240	0.0206		0.0131	0.0132	0.100	0.00480	pCi/g	12/08/20 18:08	12/29/20 09:30	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
<i>Pu-242 (T)</i>	84.9		30 - 110					12/08/20 18:08	12/29/20 09:30	1

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Uranium-235/236	0.0238		0.0151	0.0152	0.100	0.00554	pCi/g	12/08/20 18:27	12/29/20 15:25	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
<i>Uranium-232</i>	103		30 - 110					12/08/20 18:27	12/29/20 15:25	1

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39828-2
 SDG: D1189476

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Lab Sample ID: MB 160-491192/1-A
Matrix: Solid
Analysis Batch: 493438

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 491192

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Uranium-235/236	0.002324	U	0.0154	0.0154	0.100	0.0121	pCi/g	12/08/20 18:27	12/29/20 15:25	1
Tracer	MB %Yield	MB Qualifier	Limits		Prepared	Analyzed	Dil Fac			
Uranium-232	110		30 - 110		12/08/20 18:27	12/29/20 15:25	1			

Lab Sample ID: LCS 160-491192/2-A
Matrix: Solid
Analysis Batch: 493439

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 491192

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits
				Uncert. (2σ+/-)					
Uranium-234	3.18	2.973		0.294	0.100	0.0114	pCi/g	93	84 - 120
Uranium-238	3.26	3.045		0.299	0.100	0.00463	pCi/g	94	82 - 122
Tracer	LCS %Yield	LCS Qualifier	Limits		Prepared	Analyzed	Dil Fac		
Uranium-232	99.3		30 - 110						

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Lab Sample ID: MB 160-491191/1-A
Matrix: Solid
Analysis Batch: 493386

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 491191

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Plutonium-239/240	0.003831	U	0.00938	0.00939	0.100	0.00630	pCi/g	12/08/20 18:08	12/29/20 09:30	1
Tracer	MB %Yield	MB Qualifier	Limits		Prepared	Analyzed	Dil Fac			
Pu-242 (T)	93.0		30 - 110		12/08/20 18:08	12/29/20 09:30	1			

Lab Sample ID: LCS 160-491191/2-A
Matrix: Solid
Analysis Batch: 493387

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 491191

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits
				Uncert. (2σ+/-)					
Plutonium-239/240	2.64	2.491		0.250	0.100	0.00439	pCi/g	94	81 - 125
Tracer	LCS %Yield	LCS Qualifier	Limits		Prepared	Analyzed	Dil Fac		
Pu-242 (T)	97.0		30 - 110						

QC Association Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39828-2
SDG: D1189476

Rad

Leach Batch: 490790

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-39828-1	HPPG-ESU-TU153B-B-001	Total/NA	Solid	Dry and Grind	

Prep Batch: 491191

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-39828-1	HPPG-ESU-TU153B-B-001	Total/NA	Solid	ExtChrom	490790
MB 160-491191/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-491191/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	

Prep Batch: 491192

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-39828-1	HPPG-ESU-TU153B-B-001	Total/NA	Solid	ExtChrom	490790
MB 160-491192/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-491192/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	

Tracer/Carrier Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39828-2
SDG: D1189476

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Matrix: Solid

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)	
Lab Sample ID	Client Sample ID	Pu-242 (T) (30-110)	
160-39828-1	HPPG-ESU-TU153B-B-001	84.9	
LCS 160-491191/2-A	Lab Control Sample	97.0	
MB 160-491191/1-A	Method Blank	93.0	

Tracer/Carrier Legend
Pu-242 (T) = Pu-242 (T)

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Matrix: Solid

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)	
Lab Sample ID	Client Sample ID	U-232 (30-110)	
160-39828-1	HPPG-ESU-TU153B-B-001	103	
LCS 160-491192/2-A	Lab Control Sample	99.3	
MB 160-491192/1-A	Method Blank	110	

Tracer/Carrier Legend
U-232 = Uranium-232

From: [Ridenhower, Rhonda](#)
To: [Condit, Rose](#)
Cc: [Engel, Audrey](#); [Ramirez, Joaquin](#)
Subject: RE: Parcel G Alpha Spec request
Date: Wednesday, December 2, 2020 9:19:43 PM

EXTERNAL SENDER

Rose,

All samples have had Iso U and Pu added. I will post the sample confirmation in the morning.

Thank you,
Rhonda

Rhonda Ridenhower
Client Service Manager

Phone: 314-298-8566
Direct: 314-787-8227

E-mail: Rhonda.Ridenhower@eurofinset.com

From: Condit, Rose <rose.condit@aptim.com>
Sent: Wednesday, December 2, 2020 6:36 PM
To: Ridenhower, Rhonda <Rhonda.Ridenhower@Eurofinset.com>
Cc: Engel, Audrey <Audrey.Engel@aptim.com>; Ramirez, Joaquin <Joaquin.Ramirez@aptim.com>
Subject: Parcel G Alpha Spec request

EXTERNAL EMAIL*

Hi Rhonda, will you please add Alpha Spec – Pu-239 and U-235 to the following WO#s:

160-39748 (samples -01, -11, -21)

160-39749 (sample -01)

160-39827 (Sample -01, -11, -21)

160-39828 (sample -01)

160-40004 (Sample -01, -11, -21)

160-40005 (Sample -01)

160-40006 (Sample -01, -11, -21)

Let me know if you have any questions.

Rose Condit

Project Chemist

O 925 288 2151

M 925 890 5373

 rose.condit@aptim.com



* WARNING - EXTERNAL: This email originated from outside of Eurofins TestAmerica. Do not click any links or open any attachments unless you trust the sender and know that the content is safe!